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PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

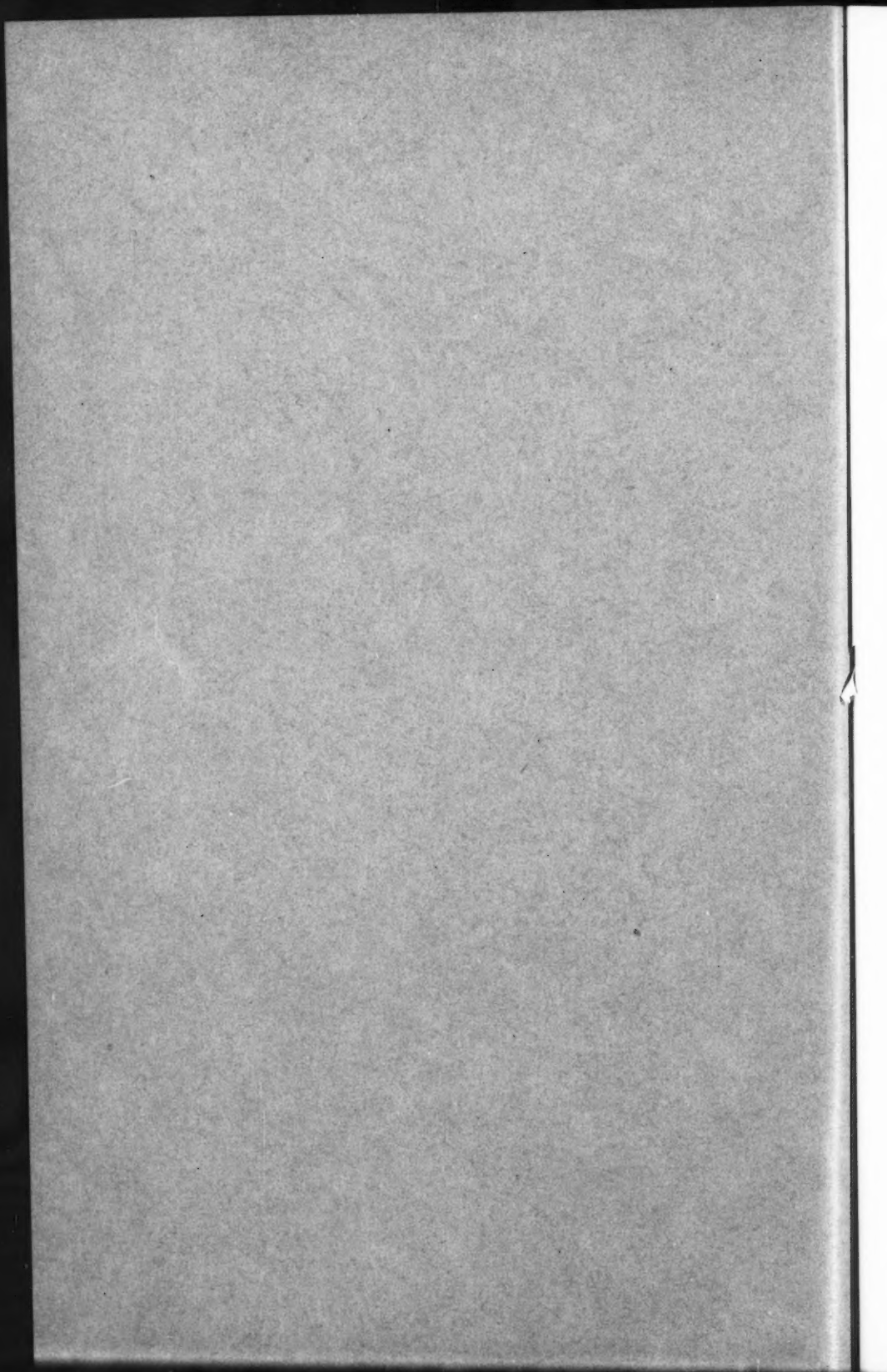
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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

VOL. XLII—No. 5

MAY, 1916

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CONTENTS

Society Affairs.....	Pages 309 to 402.
Papers and Discussions.....	Pages 623 to 832.

NEW YORK 1916

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TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, Jr., E. G. Haines, Allen Hazen, James C. Meem, Walter J. Douglas.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellow.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, William McNab, G. J. Ray, Albert F. Reichmann, F. E. Turneure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....1446 Circle.

CABLE ADDRESS....."Ceas, New York."

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, April 19th and May 3d, 1916.....	309
Of the Board of Direction, April 18th and 19th, 1916.....	314
Report in Full of the Meeting of the Society, April 19th, 1916.....	317
Society Items of Interest	344
Announcements:	
Hours during which the Society House is open.....	345
Future Meetings.....	345
Annual Convention	345
Searches in the Library.....	345
Papers and Discussions.....	346
Local Associations of Members of the American Society of Civil Engineers.....	346
Minutes of Meetings of Special Committees.....	352
Privileges of Engineering Societies Extended to Members.....	355
Accessions to the Library:	
Donations.....	358
By purchase.....	362
Membership (Additions, Changes of Address, Reinstatements, Resignations, Deaths).....	363
Recent Engineering Articles of Interest.....	374

MINUTES OF MEETINGS OF THE SOCIETY

April 19th, 1916.—The meeting was called to order at 8.30 P. M.; Vice-President Clemens Herschel in the chair; Chas. Warren Hunt, Secretary; and present, also, 120 members and 15 guests.

A paper by James B. Hays, Jun. Am. Soc. C. E., entitled "Designing an Earth Dam Having a Gravel Foundation, with the Results Obtained in Tests on a Model," was presented by title, and discussed by Edward Wegmann, M. Am. Soc. C. E. Written discussions on this paper by Messrs. W. G. Bligh, J. C. Oakes, C. E. Grunsky, H. T. Pease, and Malcolm Elliott, were presented by title.

The following subject was taken up for informal discussion:

"What relations should exist between the National Engineering Societies and the local sections or associations of their members, and, in the interests of the Profession, what should be the attitude of both of the above to other local engineering societies or clubs?"

Mr. Hunt opened the discussion from the standpoint of the American Society of Civil Engineers, and read a communication on the subject from the President, Dr. Elmer L. Corthell.

The subject was discussed by Paul M. Lincoln, Past-President, Am. Inst. Elec. Engrs., D. S. Jacobus, President, Am. Soc. Mech. Engrs., W. L. Saunders, Past-President, Am. Inst. Min. Engrs., C. D. Marx, and George F. Swain, Past-Presidents, Am. Soc. Civ. Engrs., and by Messrs. John F. Coleman, F. G. Jonah, D. Bontecou, H. S. Crocker, and John Bogart.

On motion, duly seconded, it was ordered that the report of the discussion on the relations existing between National Engineering Societies and local associations of their members, etc., be printed in full in *Proceedings*.*

The Secretary presented the report of the Tellers appointed to canvass the ballot on the following questions relating to the proposed revision of the Constitution:

"No. 1—Shall membership in the Society be open to women as well as men?

"No. 2—The Board of Direction now elects members in all grades. Shall it also have power to expel and discipline?

"No. 3—Shall the duties of a Professor of Engineering in a technical school be considered as equivalent to responsible charge of engineering work? (At present such duties are only counted as active practice.)

"No. 4—Is it desirable that the Society should adopt some form of District Organizations along lines advocated by the Meeting of the Presidents of the Local Associations at the time of the Annual Meeting of 1915?

"No. 5—Shall persons who are engaged in the promotion, manufacture, or sale of proprietary or patented articles used in engineering work

(a) Be admitted to the Society?

(b) If so, shall they be placed in a class by themselves?

"No. 6—Shall the present requirements for admission to the highest grade of Corporate Membership be increased?"

"NEW YORK, N. Y.

April 15th, 1916.

"TO THE BOARD OF DIRECTION,

"AMERICAN SOCIETY OF CIVIL ENGINEERS:

"The Tellers appointed to canvass the Ballot on the Proposed Revision of the Constitution report as follows:

"Total number of Ballots received..... 3 219

"Ballots from members in arrears of dues... 25

" with illegible signatures..... 4

" unsigned 21

" stamped, not signed..... 10 60

Ballots to be counted..... 3 159

* See pp. 317-343.

"Question No. 1	Yes 1 352	No 1 746	Total 3 099	Majority against	394
" " 2	" 2 650	" 434	" 3 084	" in favor	2 216
" " 3	" 1 283	" 1 804	" 3 087	" against	521
" " 4	" 2 414	" 432	" 2 846	" in favor	1 982
" " 5(a)	" 1 042	" 1 926	" 2 968	" against	884
" " 5(b)	" 1 282	" 470	" 1 752	" in favor	812
" " 6	" 1 455	" 1 478	" 2 933	" against	23

"Respectfully submitted,

"ARTHUR S. TUTTLE,

"LINCOLN BUSH,

"CHAS. WARREN HUNT,

"Tellers."

The Secretary announced the election of the following candidates on April 18th, 1916:

As MEMBERS

HENRY GIRDLESTONE ACRES, Toronto, Ont., Canada
 HOMER GAGE BALCOM, New York City
 LEWIS WARRINGTON BALDWIN, Savannah, Ga.
 WILLIAM HENRY BRENTON, San Francisco, Cal.
 OLIVER WESTON CONNET, Baltimore, Md.
 JENKS BUFFUM JENKINS, Baltimore, Md.
 WILLIAM WARREN ORCUTT, Los Angeles, Cal.
 WILLIAM ROBERT POWRIE, Minneapolis, Minn.
 ROBERT MALCOLM WATSON, Rutherford, N. J.
 EDMUND LEE ZEARLEY, Uniontown, Pa.

As ASSOCIATE MEMBERS

WALTER RUSSELL ABBOTT, Seneca Falls, N. Y.
 STANLEY EDWARDS BATES, Chicago, Ill.
 WALTER SAMUEL BAVER, Johnstown, Pa.
 THOMAS BERNARD BERGAN, Auburn, N. Y.
 FRED MERRITT BILLINGS, San Diego, Cal.
 JAMES ALANSON CHILDS, St. Paul, Minn.
 JOHN JOSEPH COX, Ann Arbor, Mich.
 HARDY CROSS, Providence, R. I.
 JOSEPH AUGUSTINE FAHY, Pensacola, Fla.
 LEE FRASER, New York City
 FRED FORAKER FRIEND, Mercedes, Tex.
 RIDGWAY MILLS GILLIS, Kalama, Wash.
 FRANK STICKNEY GREELY, Seattle, Wash.
 WILLIAM GARRETT GROVE, New York City
 FREDERICK ALBERT HOLSTMAN, Chicago, Ill.
 JOHN RUDOLPH IAKISCH, Powell, Wyo.
 HENRY KERCHER, Cleveland, Ohio
 JAMES IRWIN KUHN, Pittsburgh, Pa.

WALT FERD LEHFELT, Milwaukee, Wis.
GEORGE ABRAHAM McCLELLAN, Bonham, Tex.
HARRY ASH PEARCE, Ancon, Canal Zone, Panama
WILLARD FRED POND, Rochester, N. Y.
BERNHARD RASMUSSEN, La Vega, Dominican Republic
WARD HALL REAM, New York City
HARRY CALVIN REEDER, San Francisco, Cal.
WILLIAM HATFIELD SEARS, Chattanooga, Tenn.
ARTHUR LASSELL SHAW, Fall River, Mass.
EVERETT CLERC SMITH, JR., Ambridge, Pa.
SOMERS HANSON SMITH, Chicago, Ill.
PHILIP FREDERICK STEPHENS, Rochester, N. Y.
JAMES LAWRENCE THAYER, Davenport, Wash.
HERBERT HERMAN TRACY, Norfolk, Nebr.
ALBERT MATTHIAS WOLF, Melrose Park, Ill.
RENE BARBER WRIGHT, Portland, Ore.

As JUNIORS

JOSÉ VILLES BAGTAS, Atimonan, Philippine Islands
CLAUDE GILBERT BENHAM, Norfolk, Va.
SIDNEY BREESE BOWNE, Mineola, N. Y.
FREDERICK AUGUSTUS WILLIAM DAVIS, New York City
GUILLERMO DE LA GUARDIA, New York City
EDWARD JAMES DOUGHERTY, South Baltimore, Md.
HEZEKIAH SHAILER DOW, New York City
LAWRENCE SCOFIELD HOLMBOE, Oklahoma City, Okla.
ALEXANDER MATTHEWS McKEAN, Providence, R. I.
RALPH RICHARDSON MARRIAN, Watertown, N. Y.
JOHN SIEMON MEANS, Denver, Colo.
SELBY QUATTLEBAUM, Roanoke, Va.
ERICH ERNEST FREDERICK SCHMIED, New York City
HERSCHEL C. SMITH, Norman, Okla.
RICHARD LAURENCE TEMPLIN, Champaign, Ill.
FRANK LLOYD WEAVER, Baltimore, Md.
CLAUDE ALLEN WEBB, New York City

The Secretary announced the transfer of the following candidates on April 18th and 19th, 1916:

FROM ASSOCIATE MEMBER TO MEMBER

HUNLEY ABBOTT, New York City
MELVIN DAVID CASLER, Mount Vernon, N. Y.
PAUL AUGUST HARTUNG, Kansas City, Mo.
FRANK CECIL MAGRUDER, Scottsbluff, Nebr.
HARRY LINCOLN NOYES, Niagara Falls, N. Y.
FRANK HAROLD SHAW, Lancaster, Pa.

ROGER WOLCOTT TOLL, Denver, Colo.
HOWARD PLATT TREADWAY, Kansas City, Mo.
ALEXANDER PIRIE YOUNG, Topeka, Kans.

FROM JUNIOR TO ASSOCIATE MEMBER

ARTHUR POPE ACKERMAN, Cornwall-on-Hudson, N. Y.
HOWARD FRED BELL, Cody, Wyo.
ROBERT HAMMOND BOYNTON, Frankfort, Ind.
GRAHAM BERNARD BRIGHT, Blacksburg, Va.
WILLIAM ELIJAH BUELL, JR., Montreal, Que., Canada
JOHN CLAUSNITZER, New York City
CHARLES LOUIS DIMMLER, Berkeley, Cal.
WILLIAM FREDERICK FOX, New York City
HENRY COLLINS HITT, Tacoma, Wash.
RIDGELY CASEY LILLY, Vicksburg, Miss.
DONALD HEBARD MAXWELL, Chicago, Ill.
EDWARD HARPER PRENTICE, Amsterdam, N. Y.
HERMAN FRED SCHOLTZ, Seattle, Wash.
GEORGE CARTER STONE, Boston, Mass.
HOWARD THOMAS WARE, El Paso, Tex.
WILLIAM WEST WILSON, Washington, D. C.
LAWRENCE LEWIS WINANS, Austin, Tex.

The Secretary announced the following deaths:

FREDERICK WILLIAM DOANE HOLBROOK, of Seattle, Wash., elected Member, October 6th, 1886; died April 13th, 1916.

FRANS ENGSTRÖM, of Pittsburgh, Pa., elected Associate Member, May 4th, 1892; died March 20th, 1916.

Adjourned.

May 3d, 1916.—The meeting was called to order at 8.30 P. M.; V. H. Hewes, M. Am. Soc. C. E., in the chair; Chas. Warren Hunt, Secretary; and present, also, 88 members and 11 guests.

The minutes of the meetings of March 15th and April 5th, 1916, were approved as printed in *Proceedings* for April, 1916.

A paper by H. H. Wolff, M. Am. Soc. C. E., entitled "The Design of a Drift Barrier Across White River, near Auburn, Washington", was presented by the author and illustrated with lantern slides.

The Secretary announced the following deaths:

HENRY COATHUPE MAIS, of Melbourne, Victoria, Australia, elected Member, June 6th, 1883; died February 25th, 1916.

WILLIAM RIDLEY NEELY, of Portsmouth, Va., Elected Member, July 9th, 1906; died April 11th, 1916.

CHARLES HENRY PRESTON, of Norwich, Conn., elected Member, October 5th, 1909; died April 20th, 1916.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

April 18th, 1916.—The Board met at 10 A. M.; Vice-President Herschel in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bontecou, Bush, Clapp, Coleman, Craven, Crocker, Davies, Duryea, Endicott, Fuller, Haskell, Hawley, Humphreys, Jonah, Keefer. Khuen, McDonald, Marx, Montfort, Ricketts, Swain, and Tuttle.

A communication from the Seattle Association of Members on matters connected with the Weather Bureau was reported upon by a Committee consisting of Messrs. Hedges, Crocker, and Marx, as follows:

"The Committee to which was referred the question of extending the functions of the weather service, especially in the middle and far western States so that precipitation records be taken at additional points and especially at higher elevations on the various drainage areas, recommends that the Board of Direction of the American Society of Civil Engineers petition the Weather Bureau to extend its service, and pledges its support to a measure to be introduced by the Weather Bureau in Congress to this effect, and through the proper channels."

The recommendation of the above Report was adopted.

Various appropriations were made for the expenses of Special Committees.

The rules now in force regarding admission requirements were rescinded, and new rules were substituted.*

The paying off of the balance of the mortgage (\$40 000) by the sale of certain securities held in the Reserve Fund was reported, the property of the Society now standing free and clear.

The appointment of Messrs. Fred Lavis, Chandler Davis, B. F. Cresson, Jr., P. W. Henry, and Edgar Marburg, as representatives of this Society on the Joint Pan-American Engineering Committee was reported.

The following resolution was adopted:

"WHEREAS: the Board of Direction has received from the Philadelphia Association of Members of the American Society of Civil Engineers the formal charge that John A. Ockerson of St. Louis, a Member of this Society, in a circular widely circulated by him among members of this Society, made certain inaccurate and incorrect statements, among them the following, namely:

"'An invitation has been extended to the American Society of Civil Engineers to enter 'the United Engineering Society as an additional Founder Society.' This invitation itself shows that the destinies of the 'Founder Societies' is largely if not wholly controlled by a superior authority, and the fact must not be overlooked that the relationship which exists between the United Engineering Society and the Founder Society which

* See page 344.

gives the former authority over them, has not been presented in detail to our members.

"Suppose we become an 'additional Founder Society', and desire to put before the public a measure which we have conceived and which we deem important. It must have the sanction of the United Engineering Society, representing a majority of the Founder Societies, which can prevent action, or, if approved, the United Engineering Society would stand before the public as the sponsor of the measure. This illustration applies equally to all of the Founder Societies;"

"NOW THEREFORE: Voted:—that there is nothing in the Constitution or management of the United Engineering Society to warrant the assertions above quoted. The United Engineering Society is the equivalent of a Board of Trustees created by the three Founder Societies occupying the 39th Street Building, of which this Society has been invited to become a fourth, and was created and is carried on for business purposes connected with the management of the real property and libraries of the Founder Societies.

"VOTED FURTHER: that a copy of these resolutions be sent by the Secretary to the Secretaries of each of the local Associations of Members of this Society."

The following resolutions with relation to the Joint Conference Committee of Engineering Societies were adopted:

"RESOLVED: That the Joint Conference Committee of Engineering Societies be increased by the addition of one member from each of the five constituent societies, so that each will be represented by three members."

"RESOLVED: That the Joint Conference Committee of Engineering Societies shall have authority to take action on all general or public matters relating to the welfare of the Profession, and in connection with which joint action seems desirable; on the condition that the Joint Conference Committee records in its minutes any action taken and reports such action for approval at the next subsequent meeting of the governing bodies of each of the constituent societies."

Action was taken on members in arrears for dues.

The resignations of 2 Members, 3 Associate Members, and 4 Juniors, were accepted.

Adjourned.

April 19th, 1916.—The Board met at 5 P. M.; Vice-President Herschel in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bogue, Bontecou, Bush, Clapp, Coleman, Craven, Crocker, Davies, Duryea, Endicott, Fuller, Greiner, Harwood, Haskell, Hawley, Humphreys, Jonah, Keefer, Khuen, McDonald, Marx, Montfort, Swain, and Tuttle.

The following resolutions were adopted:

"RESOLVED: That it is the sense of this Board that the railroads of this country are indispensable to its defence.

"RESOLVED: That any movement having in view the National defence should embrace among other things the following essentials:

"(A) The selection by the Government in advance of such trunk lines, or groups of lines, as will best serve for the transportation of troops, munitions, and sustenance under all probable theories of points of attack.

"(B) The determination in advance of the compensation to be paid the railroads for transportation of troops, munitions, and supplies.

"(C) The collection by the National Government of full information as to the capacities of the railroads of the country to meet military emergencies.

"(D) The training of Government and railway officers and employees for thorough co-operation in all matters connected with military transportation.

"(E) The establishment of facilities for, and the removal of obstacles to, the prompt movement of troops, munitions, and supplies, over the railroads of the country.

"RESOLVED: That a copy of this resolution be forwarded to the Secretary of War and the American Railway Association, and the Subcommittee of the Naval Advisory Board in charge of gathering information in the interest of Preparedness."

A report from the Membership Committee, which had been in session since 10 A. M., was received and acted upon.

Ballots for membership were canvassed, resulting in the election of 10 Members, 34 Associate Members, 17 Juniors, and the transfer of 17 Juniors to the grade of Associate Member.

Nine Associate Members were transferred to the grade of Member. Applications were considered and other routine business transacted.

Adjourned.

**REPORT IN FULL
OF AN INFORMAL DISCUSSION AT THE HOUSE OF
THE AMERICAN SOCIETY OF CIVIL ENGINEERS,
ON THE EVENING OF APRIL 19th, 1916, ON THE SUBJECT:**

"What relations should exist between the National Engineering Societies and the local sections or associations of their members, and, in the interests of the Profession, what should be the attitude of both of the above to other local engineering societies or clubs?"

April 19th, 1916.—The meeting was called to order at 8.30 P. M.; Vice-President Clemens Herschel in the chair; Chas. Warren Hunt, Secretary; and present, also, 120 members and 15 guests.

THE CHAIRMAN.—The meeting will now take up the discussion of the question: "What relations should exist between the National Engineering Societies and the local sections or associations of their members, and, in the interests of the Profession, what should be the attitude of both of the above to other local engineering societies or clubs?" You will see that it is a very broad subject. The Secretary has some ideas which he will present.

CHAS. WARREN HUNT, SECRETARY, AM. SOC. C. E.—Mr. Chairman, this subject was proposed for discussion this evening because it is very important. With your permission, I will make a brief statement in reference to the formation of the local associations of the American Society of Civil Engineers.

The formation of some kind of local associations of members had been discussed casually for a number of years, but no definite suggestions were made until the early part of 1905. For some months before that time the Board of Direction had been discussing the matter, and this discussion resulted in the sending out on March 7th, 1905, of a circular-note embodying the views of the Board to at least three specially selected members of the Society in Albany and Troy, Boston, Cleveland, Chicago, Detroit, Kansas City, Mexico City, New Orleans, Philadelphia, Pittsburgh, St. Louis, St. Paul and Minneapolis, San Francisco, and Washington. The whole subject was taken up for discussion at the Cleveland Convention, in June, 1905. The views of the Board of Direction and the circular sent out were as follows:*

**"VIEWS OF THE BOARD OF DIRECTION AS TO THE FORMATION OF LOCAL
ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL
ENGINEERS, MARCH, 1905.**

"The proposed formation of a Local Association of the Membership of the Society in Washington, D. C., has led the Board to a careful consideration of the desirability of such Associations in all localities in which the membership available for such purpose is sufficient in number.

"The subject of the formation of local chapters of the Society was considered a number of years ago, but nothing was accomplished in this

* *Proceedings, Am. Soc. C. E., for August, 1905, pp. 273-274.*

direction, as there developed considerable opposition to the formation of such chapters.

"The present suggestion is understood to have a somewhat different end in view, *viz.*, the formation of local associations of our members for professional and social intercourse only. Similar propositions have been considered somewhat informally by the Board of Direction heretofore, one emanating from members residing in the City of Mexico, and another from St. Louis, although the latter proposition was merely the decision of the question as to whether the present local engineering society of St. Louis could be furnished, upon request, with certain of the Society publications, and allowed to discuss them with the privilege of having such discussion, if valuable, published by the Society. This latter question was decided by the Board in the affirmative, but nothing further has been heard from our members in that city.

"The Board recommends that, wherever possible, steps be taken calling the attention of the membership to this matter, and that such Associations be formed.

"In making this recommendation, the Board wishes to point out that associations of this character would be of great advantage to the Profession in general, and would widen greatly the influence of this Society, and enhance its standing in the various communities; that if coincidentally (or practically so) the papers issued in our *Proceedings* could be brought up for discussion at meetings in various localities and the resulting discussion forwarded to the Secretary of the Society for publication, subject to the rules in force in regard to the discussions which now take place in New York, it would result in great advantage to the *Transactions*, and that, in nearly all cases, it would be possible for the author of a paper published by the Society to be within reasonable traveling distance of some point at which his paper is to be read, and give him an opportunity to present it in person.

"It is further believed that if this project can be carried out successfully, it would bring non-resident members into closer touch with all the work of the Society, and place the non-resident member practically in the position of a resident member of the Society in the particular locality in which he lives.

"It is further submitted that the advantages to engineers who are not now members of the Society would be very great, and that the formation of such an association in any city would not interfere in any way with existing local engineering societies or clubs.

"The Board has prepared a draft of proposed By-Laws for such an association (copy enclosed herewith), which, in its opinion, would be satisfactory.

"Referring to this draft, it is believed that the following Articles: No. 1, relating to the Name, Location and Object; No. 2, relating to Membership, and No. 6, relating to Amendments, should in substance be incorporated in the By-Laws of all such associations, but that Article No. 3, relating to Dues; No. 4, relating to Officers, and No. 5, relating to Meetings, may all be varied in detail according to special local requirements or convenience.

"These are inserted in the draft as suggestions for consideration in each special case, although it would be well if, in all matters except the amount of dues, all such associations had exactly similar By-Laws.

"In this connection it should be noted that the Resident Membership of the Society pays an additional fee of \$10 per annum for the special privileges of such membership, and that a much less yearly sum would probably suffice for the dues in Local Associations as outlined herein.

"By order of the Board of Direction.

"CHAS. WARREN HUNT,
"Secretary."

Enclosed with this was a proposed form of Constitution for Local Associations, composed of 6 articles covering name, location, and object, membership, dues, officers, meetings, and amendments. The important things were: The objects, which were stated to be "advancement of engineering knowledge and practice, the maintenance of a high professional standing among its members, and the furtherance of the general welfare of the American Society of Civil Engineers".

"Among the means to be employed for these purposes shall be: Meetings for the presentation and discussion of professional papers, particularly those issued by the American Society of Civil Engineers, and the encouragement of engineers who are not members to attend and take part in the professional and social features of such meetings."

Under the head of Membership: "The membership of this Association shall be restricted to persons who are members of the American Society of Civil Engineers in any grade and who reside within..... miles of..... All such may become members of this Association without payment of Entrance Fee, but should the membership in the American Society of Civil Engineers of any person cease from any cause, he shall at the same time cease to be a member of this Association."

Under the head of Meetings: "At these meetings the business of the Association shall be transacted, and the discussion of professional papers published by the American Society of Civil Engineers, or specially prepared for the occasion, shall be in order. Such discussions may be furnished to the Secretary of the American Society of Civil Engineers for publication, subject to the approval of the Publication Committee of that Society."

Under the head of Amendments: "This Constitution may be amended only by a two-thirds vote of all members of the Association, which vote may be taken, if necessary, by letter-ballot, provided such amendment shall have previously received the approval of the Board of Direction of the American Society of Civil Engineers."

The important clauses, which every Association now in existence has adopted, are the statement of the Objects of the Association, the Restriction in Membership, and the clause covering proposed Amendments. All other matters, such as number of officers, dues, number of meetings, and in short everything which should be decided locally, are different in the various Associations.

At the discussion at the Cleveland Convention a great deal of opposition to the proposed movement developed. In Pittsburgh a vote was taken by which it appeared that those in favor of the formation of a Local Association in that city were 14, while those who opposed it numbered 42.

In Washington, where the movement started, no decision was reached at that time. In Cleveland the reports indicated that favorable action might be expected. In Boston it was stated to be the unanimous opinion of those who had been consulted that it would be difficult to arouse sufficient enthusiasm to have such an organization. In St. Louis a meeting of members held March 24th, 1905, adopted a resolution to the effect that it was not desirable at that time to have such an organization in St. Louis.

In Philadelphia and Chicago it was evident that there was no possibility of accomplishing anything.

At all events, it seems to be of interest to state that, of the 15 Associations now in existence, there are only 5 in the cities selected by the Board at that time; *viz.*, San Francisco, Cleveland, Philadelphia, New Orleans, and St. Louis, and that there are now flourishing Associations in Denver, Atlanta, Seattle, Portland, Ore., Los Angeles, Texas, Spokane, Baltimore, and San Diego, Cal.

Doubtless the increase in total membership of the Society from 3 249 in 1905 to 7 879 in 1916—143% in 11 years—has had much to do with making these Associations possible. It also will be noticed that the advisability, or even necessity, for such Associations seems to increase with the distance from headquarters, as there are 6 Associations in 3 States, California, Oregon, and Washington, and only one each in Colorado, Missouri, Texas, Louisiana, and Georgia.

The objections that were made in various localities were almost all based on the probable effect that the formation of such Associations of this Society would have on already existing Local Engineering Societies or Clubs. A committee of members in Chicago summed up the objections, stating:

"The local engineering societies as they exist seem to satisfy local needs. They are generally organized along the same lines and the plan followed may reasonably be assumed to fit the requirements. They manage their own affairs, and this satisfies the desire for a fair degree of independence usually felt. A chapter, on the other hand, would suffer from its lack of independence. Sectional jealousies might become aroused and impair the allegiance to the parent Society and the good feeling which now so happily exist."

The speaker remembers very well trying by word of mouth and by correspondence to point out that, if properly handled, such Associations would be a benefit rather than a detriment to existing Local Societies or clubs, the general line of argument being as follows:

1. Members of this Society are almost universally members of any local Engineers' Club.

2. The difficulty in keeping up interest in local meetings lies largely in the fact that professional papers cannot be published in advance of their presentation for discussion, and sometimes they are not published at all, and Engineers will not go to the trouble and expense of preparing papers unless there is a good prospect of publicity and valuable discussion.

3. That by using the papers published by the Society in *Proceedings* for discussion at meetings held under the auspices of the Local Association in the rooms of the local club, and inviting members of the latter to attend and take part, interest would be stimulated, and the local club strengthened.

These, and similar arguments, did not seem to be of much avail, and in only three places Local Associations were formed during 1905, Kansas City (April 8th) San Francisco (April 28th), and Memphis (October 10th). The Kansas City and Memphis Associations may still be alive, but practically nothing has been heard from them since the date of their organization. The San Francisco Association, on the contrary, has been very successful and very useful, as is evidenced by its increasing membership, financial condition, and the work it has done.

The next Association formed was the Colorado Association, with headquarters in Denver. The date of its organization was December, 1908. The Atlanta, Ga., Association was organized on March 14th, 1912. Five Associations were formed during 1913: Philadelphia, Seattle, Portland, Ore., Southern California (Los Angeles), and Texas; five in 1914, Spokane, Louisiana (New Orleans), Baltimore, St. Louis, Northwestern (Minneapolis), and two in 1915, Cleveland and San Diego, Cal.

At the Annual Meeting of January, 1915, a Conference of the Presidents of these Associations was held, and recommendations were made that the membership of the Society be divided geographically into Districts; every member of the Society residing in the territory covered by that District to become a member of the District Organization without payment of further dues. Each District to have a President or Chairman, and a Secretary, and existing Local Associations in that District to become Local Sections reporting to the management of the Society through the District Organization; each District to elect its own representative on the Board of Direction of the Society.

A Committee of the Board of Direction appointed to prepare a revised Constitution of the Society decided to place certain fundamental questions before the membership for its opinion before drawing up the Constitution, and one of the questions was:

"Is it desirable that the Society should adopt some form of District Organizations along lines advocated by the Meeting of the Presidents of the Local Associations at the time of the Annual Meeting of 1915?"

Out of the total vote of more than 3 100 Corporate Members of the Society the majority in favor of District Organizations on the lines suggested by the Presidents of the Local Associations was 85 per cent.

It is evident that the Local-Association idea, and probably the General-District idea, has come to stay, so far as this Society is concerned, and this question has been brought to the attention of this Meeting for the purpose of securing the assistance of representatives of the other National Societies in an attempt to find out what the difficulties have been, and what general relations should be established with each other by all these Local Associations, and in the hope of securing some basis for co-operation between all Local Engineering Associations, whether members of the National Societies or non-members, which will result in benefit to the Profession in general.

Mr. Chairman, the President of this Society, Dr. Elmer L. Corthell, is unfortunately prevented from being present this evening, much to his regret. He is in the country, and quite ill, but from his sick bed he dictated the following for presentation here as his suggestions for a plan:

ELMER L. CORTHELL, PRESIDENT, AM. SOC. C. E. (by letter).—In this carefully considered outline plan, the objects kept in view are the *Solidarity* of the Engineering Profession in the United States and the *Independence* of its individual Society Units.

ELEMENTS.

A.—“*Joint National Conference Committee*” of the five National Engineering Societies—Civil, Mechanical, Electrical, Mining, and Marine Engineering and Naval Architecture,

B.—“*Joint Local Conference Committees*” of the Associations or Chapters of the Societies above named located at population centers of the country (including members in districted areas) constituting a connecting “live wire” with the

C.—*Local Engineering Societies.*

SCOPE AND DUTIES OF EACH ELEMENT.

1st.—(A) (Joint National Conference Committee) will embrace all general and National Engineering subjects, problems, and policies, transmitting to (C) (Local Engineering Societies), through (B) (Joint Local Conference Committees) information, and receiving from (C) through the same channel their desires and suggestions.

2d.—The National Societies, through their Joint Local Conference Committees, will encourage their members to apply for membership in the Local Engineering Societies, and the latter will, through the Joint Local Conference Committees, encourage their members, on the other hand, to apply for admission in the National Societies—and all Societies through the same channel will urge engineers not now mem-

bers of any Society (the number being considerable) to apply for membership in *some* Society—with the view to consummating effectively the solidarity of the entire Profession, numbering it is estimated more than 60 000.

3d.—*Technical Literature*.—Papers of general, National or international interest to be, generally, presented to the National Societies; but those of Local, Municipal, and State interest to be presented to the Local Engineering Societies—as the former demand a National distribution and the latter a local circulation.

4th.—All Societies—National and Local—through the intermediary of the Joint National Conference Committee and the Joint Local Conference Committees, to work for the promotion, protection, and advantage of every one of its 60 000 members—from the National, State, Municipal, and individual point of view—in matters of legislation—National, State and Municipal—in civic and patriotic measures—in employment of the Engineer and in the publicity necessary and proper to bring to the notice and appreciation of the public at large—and the National, State, and Municipal Governments, the duty, ability, and determination of the Engineer to assert and assume his rightful place in the body politic as a useful, interested and patriotic citizen.

5th.—The plan above outlined, if carried into full and effective execution, will redound to the public welfare and to the general and personal advantage of the Engineer, and it will soon prove to the Nation that his fundamental purpose is not altogether to “make a living, but to live a life” of high endeavor and usefulness, and with the motto “*Service and Self Sacrifice*”.

THE CHAIRMAN.—We have with us this evening members of the other three National Engineering Societies, the American Institute of Mining Engineers, the American Institute of Electrical Engineers, and the American Society of Mechanical Engineers, which Societies have had considerable experience in the formation and working of local associations and sections. I will call on Paul M. Lincoln, Past-President of the American Institute of Electrical Engineers, kindly to open the discussion.

PAUL M. LINCOLN, PAST-PRESIDENT, AM. INST. ELEC. ENGRS.—Mr. President and gentlemen of the American Society of Civil Engineers, the question before you to-night is a general one as to the relations which should exist between the National Engineering Societies and their branches or sections in various localities throughout the country.

I believe this is a question which each of the National Societies must study in its own way, for its own particular conditions. For my part, I can simply enlighten you to some extent concerning the experience of the American Institute of Electrical Engineers on this question, and that will be useful to your Society only in so far as you

may find application for it; I do not advance these ideas as necessarily a general answer.

Now, let me call your attention for a moment to the history of the sections' movement in the American Institute of Electrical Engineers. That movement started with Past-President Charles F. Scott, who was elected President in 1892. At the time of Mr. Scott's election to that office, he and I were close neighbors and I had the privilege of hearing him go over this matter and express his ideas, his ideals, the things that he wished to accomplish during his presidency of the Institute, and this matter of sections of the Institute was one that was close to his heart at that time.

His reasoning concerning sections was about like this: He asked, what is our Institute to our membership? To most of them, particularly those who live at a considerable distance from headquarters, the Institute is an impersonal thing. It simply sends to its members its *Transactions* once a month, and possibly one or two other communications during the course of the year; and once a year a ballot; and that is about all the membership gets. It is an impersonal thing. It is not personal.

Now Mr. Scott's reasoning was, that in order to make our Institute of the utmost value to the membership, we must make it more than something impersonal. We must make it personal. We must bring the Institute to the men. The physical dimensions of our country make it impossible for those living in San Francisco and Chicago and other distant cities to take any active personal interest in the affairs of the American Institute of Electrical Engineers. Now, he said, "the answer to that is to form sections of our Institute in these various localities", and that was one of his first moves when he became President. I recall very distinctly that Mr. Calvin W. Rice, whom I notice in the audience here this evening, was appointed by Mr. Scott as the first Chairman of the Sections' Committee of the American Institute of Electrical Engineers, back in 1902, 14 years ago.

So that it is to Past-President Scott and his vision that the American Institute of Electrical Engineers owes what has been accomplished in the matter of sections; to him at least it owes its inception. Now, just a word as to my own connection with that movement. It happened that I was residing in Pittsburgh at that time, and it also happened that I became the first Chairman of the Pittsburgh Section of the American Institute of Electrical Engineers. A number of years afterward—in 1909, if I remember correctly—I was appointed as Chairman of the Sections Committee, following Mr. Rice, or following, possibly, Mr. Rice's successor, and held that office for some five years, if I remember correctly. During this five years, therefore, I was thrown into very close contact with the conduct of the sections movement in the American Institute of Electrical Engineers. And now, let us come

down to the present status of their local sections: First, the constitutional provisions: What are they? Well, as we see it in the American Institute of Electrical Engineers, the first requisite in the Constitution is to allow the local sections a maximum of autonomy, to place as few restrictions on them from headquarters as possible.

Let me read in part the Articles of the Constitution which make provision for these local sections. It says: "The officers of each section shall consist of a chairman, a secretary, and such other officers as each section may find desirable." That, as you see, gives a maximum of autonomy in this respect. "These officers shall be elected by the votes of the Fellows, Members, and Associates of that Section, in the manner provided in the Section By-laws. The election of any Fellow, Member, or Associate as a Section officer, shall not debar him from election or appointment to any other office in the Institute."

The object of the Constitution, therefore, is to place just as few restrictions on the activities of these sections as possible, and still retain their loyalty to the Institute; and, in that particular, I believe we have been very successful.

The number of members required to form a section is not fixed by the Constitution, but by the By-Laws. One of these By-Laws prescribes that a petition for the formation of a section "shall specify the territory to be included, and shall be signed by not less than 25 members residing therein"; that is to say, if 25 members in any given locality get together, they may request the formation of a section. That the section will be formed on the request of 25 members does not follow, that lying within the province of the Board of Directors; but 25 members may initiate such a movement; and, up to date, I think I am correct in saying that no request for the formation of a section coming from 25 members or more, has been refused.

At the present time we have 32 of these sections, including one which has just been authorized in Kansas City, Mo. These 32 sections are distributed geographically all the way from Panama and Mexico on the south to Vancouver and Toronto on the north; from San Francisco, Portland, Los Angeles, and Seattle on the west, to Boston, Baltimore, Washington, and Atlanta on the east.

Just a word about the expenses. How do we look after the expenses of these sections' meetings? The parent body, the American Institute of Electrical Engineers, appropriates money to a certain extent for the sections' meetings. The amount to be appropriated is fixed by the by-laws. Perhaps you will be interested in knowing just how that is taken care of. Let me quote from the by-laws:

"It shall be the duty of the Secretary of the Section to send to the chairman of the Sections Committee, on or before October 1st of each year, an estimate of the appropriations required from the Institute

for the expenses of the Section during the year ending the 30th of the following September.

"Each Section shall conduct its affairs in such a manner as to demand for its maintenance a minimum of financial support by the Institute consistent with the activities carried on by that Section. Excepting upon the request of a Section stating specific reasons therefor, and special action thereon by the Sections Committee, the appropriation of Institute funds during any fiscal year for the meeting expenses of any Section shall not exceed in the aggregate a sum to be determined as follows:

"a. One hundred dollars for each Section, independently of the number of members in that Section.

"b. One dollar and a quarter for each Institute member who shall reside within the territory of each Section at the beginning of the administrative year."

In addition to these two items for the expenses of the Sections, they are allowed to have what are known as local memberships, that is, they may admit local members within the limits of the local sections, charging the members an amount which varies usually one or two dollars a year. Some of the sections, particularly in Schenectady and Lynn, take advantage of that particular feature to a very considerable extent.

There is one other provision, in the American Institute of Electrical Engineers, which I think is of tremendous benefit in keeping this section movement in a healthy condition, and that is the provision in the Constitution for the payment of the traveling expenses of a delegate from each Section to the Annual Convention, which occurs usually in the latter part of June. This insures a full attendance of Section representatives at the Annual Convention and there they have official standing as Section delegates. They talk over their affairs, and have enthusiastic meetings. That, I believe, is one of the main forces back of the Section movement in the American Institute of Electrical Engineers, the fact that the traveling expenses of the Section delegates are reimbursed by the Institute. It induces a rather full attendance at these Section meetings, and has had a very good effect on them. I will give you a little more on that line later.

There is another point on which we should lay stress here to-night, and on which we have labored considerably in the local Sections of the American Institute of Electrical Engineers, and that is the matter of co-operation between the local Sections of our Institute and the other engineering bodies in those localities. It is a matter which has been talked over to a very considerable extent, and we have a large amount of experience on it. I am going to dwell on that point for a few moments. It has always been my endeavor and aim, so far as I have been able to guide the Sections, to insist that the spirit behind the relations between the local Sections of the American Institute of

Electrical Engineers and the other engineering bodies in any locality, shall be one of co-operation rather than antagonism.

Antagonism will never get us anywhere, whereas co-operation is the thing for which we are all striving; so it has always been my endeavor to work for that co-operation. It has also been my feeling that there was no cast-iron way of bringing about co-operation in any local Section, that the methods of bringing about that co-operation were necessarily local problems, and had to be worked out in each locality for itself.

This question of the methods of bringing about co-operation has been a matter of debate in the Sections to a considerable extent, and I am just going to read to you some of the reports of the Sections delegates at our Sections meeting. These reports are printed each year, and I have here, for instance, the report of the conference of the Sections delegates for 1913. This convention was held at Cooperstown. There the question of co-operation was taken up to a considerable extent, and Mr. Ralph H. Rice, who was at that time Chairman of the Chicago Section, at that meeting gave us rather a full report of the methods of bringing about co-operation between the Societies in the City of Chicago.

The following is quoted from the report of Chairman Rice at the Cooperstown Convention in 1913.

"Four years ago we started a plan of co-operation which has been very successful. The Western Society of Engineers has its headquarters in Chicago, and numbers something like 1 100 members, I believe. They have an Electrical Section, among others, and we join with that Section, so we hold monthly joint meetings of the American Institute of Electrical Engineers, Chicago Section, and the Electrical Section of the Western Society of Engineers. These meetings are very successful. We have an attendance of from 100 to 150, on an average, the attendance sometimes running as high as 400 and 500—that is when Dr. Steinmetz comes out, in October.

"The method of organization is this: We have a chairman and a secretary elected every year. We have three members of the Executive Committee, one elected each year representing the American Institute of Electrical Engineers. We have three members of the Executive Committee representing the Western Society of Engineers. These eight men constitute the Executive Committee, and they handle all the affairs in these joint meetings. This year we have had one joint meeting with the National Electric Light Association, the Commonwealth Edison Company Branch, in Chicago, we also are starting to devise means now for co-operating with the newly formed branch of the American Society of Mechanical Engineers, and have had one meeting with that organization, at which Dean Goss, the President of the Society, presided, and President Mershon of the Institute gave the address of the evening.

"Now, we find that that co-operation is a thing that pays, that is the thing that I would prefer to bring here to-night, the value of co-

operation with other societies. I think the plan can be worked out with very great success in probably most of the Sections."

In 1914 the same subject was treated very fully, and the method used in Boston was given to us by Mr. George W. Palmer. He says:

"As to co-operation with other societies, of which considerable was said at the Sections delegates' luncheon, in Boston, we had a Section of the American Society of Mechanical Engineers of which I am a member, the Boston Society of Civil Engineers, the oldest engineering society in the country, and, of course, our own Section. It has been the plan for some years past to hold at least three joint meetings each year, one under the auspices of each of these Sections of the engineering societies, each section in turn being responsible for the programme and having charge of the meeting. In addition to that, this last year we have had what we call our Joint Engineering Dinner, on a somewhat elaborate scale. This dinner proved to be very successful in bringing out a large attendance."

Then, at the same time, at the same meeting, the plan which was followed in Atlanta was given to us in considerable detail. Mr. A. M. Schoen, who was Chairman of the Atlanta Section at that time, gave us this. He said:

"We brought into this organization, that is now known as the Affiliated Technical Societies of Atlanta, the local branches of the American Institute of Architects, of the American Society of Mechanical Engineers, of the American Institute of Electrical Engineers, of the American Society of Civil Engineers, of the American Chemical Society, and of the Engineering Association of the South. This gave us, as I recall, a total membership of 269. By-laws were drawn up to cover this organization, and it was stated that each Branch or Section would be responsible in every way for its own members; that in case of anything arising that should be taken up with any one of those present, it would be turned back to that particular body to be dealt with by it. These different bodies were to continue their meetings, without interference on the part of the main Society, but the affiliated body would have quarterly meetings. I should explain that there is an Executive Committee in charge of this affiliated body, and this Executive Committee is made up by an appointee from each one of the Societies, and that Executive Committee elects its own officers. The Chairman of the Executive Committee opens the meeting, and then turns it over to the particular Branch or Section that will have it in charge."

Coming down to the meeting that we had last year at Deer Park, the plan which is being followed in Philadelphia was given in some detail. Possibly you gentlemen here are familiar with that plan. There they have taken the Engineers' Club of Philadelphia as the nucleus around which the various sections of the National bodies have gathered; this is a report from Mr. Sanville, who was Chairman of the Philadelphia Section and a delegate at the Deer Park Convention last year from Philadelphia.

"The Engineers' Club provides the plant, meeting rooms, restaurant, library, and all the necessary clerical services: That is, they attend to the printing and mailing of all notices. They provide the meeting room, including a lantern, and give each affiliated society the privileges of the Engineers' Club for the afternoon, evening, and night on which it holds its meeting at the club. For this privilege each affiliated society pays a fee based on its membership within a radius of 10 miles of the center of the city. The Institute Section has its monthly meetings as usual on its regular meeting days, independent of all other meetings. The other bodies follow the same practice, and the total number of technical meetings is therefore not diminished by the affiliation.

"Each affiliated society appoints one of its members who sits on the Board of Governors of the Engineers' Club. Each affiliated society also has one member on the Papers Committee of the Engineers' Club. The Chairman of that Committee is a member of the Engineers' Club, and has no other affiliation, and the Chairman of the Publication Committee of the Engineers' Club is also a member of the Papers and Meetings Committee. The other Committee members are representatives of the affiliated societies."

As I have tried to point out, it is my belief, and I think it is borne out by the reports of our various delegates and Section Chairmen, that this matter of affiliation and co-operation with the other societies is a matter which must be worked out in each center in its own way, dependent on the conditions in each particular locality. I may be wrong, but I rather doubt that there can be any definite or cast-iron rule by which co-operation can be secured in every locality.

The object, of course, of all these meetings and affiliations among the various engineers and engineering societies is to enhance the value of the engineer in his particular locality, and to give him a wider influence in general, and particularly in civic affairs.

THE CHAIRMAN.—Now, if Professor Jacobus will tell us something of the experience of the American Society of Mechanical Engineers, we will be obliged to him.

DR. D. S. JACOBUS, PRESIDENT, AM. SOC. MECH. ENGRS.—The subject before us to-night, which has been so ably discussed by Dr. Hunt, Dr. Corthell and Mr. Lincoln, is one of the most important, if not the most important, before the Engineering Societies at the present time; it is so important that I hope to be able to appear before all the Sections of the American Society of Mechanical Engineers during my term as President in an endeavor to obtain the views of the membership at large.

There was a good representation from the Sections from all parts of the country at the recent meeting of our Society in New Orleans, and in conferring with members from many different districts it would appear that there is a closer co-operation between the members

of the different Sections than there is between the governing boards of the Societies. Our governing boards should get together, and the quicker we do so the better it will be for us. It certainly would be a good move to have a joint meeting of the Committees of the Sections of the several Societies, as suggested by your President, Dr. Corthell.

I agree with Mr. Lincoln that there should not be too many restrictions in the management of the Sections, especially at this time when we have not established a definite policy. Every Section has special problems of its own to deal with and must use its own methods. Our management should be broad and such as to inspire loyalty and foster co-operation. I was much gratified in meeting the members of the different Sections to find them enthusiastically in favor of co-operation, and it is, therefore, a most opportune time for the managing boards of our Societies to get together and devise a means whereby this may be accomplished in the best way for all concerned. Our members have shown such a fine example in co-operation that it only needs a little encouragement from headquarters to spread this spirit throughout the country and thereby enhance the interests of the entire Profession. I hope, therefore, that Dr. Corthell will call us together without delay.

In addition to the geographical Sections, the American Society of Mechanical Engineers has forty student branches, numbering about 1 000 student members. Young men form the life of any society, because later they will fill our places. As we grow older, we appreciate more and more that the capital of youth is a most valuable asset; in managing the affairs of our Societies, therefore, we should keep our young men well in line, for in them lies the future strength of our organizations.

THE CHAIRMAN.—We are honored, also, here to-night by the presence of W. L. Saunders, Past-President of the American Institute of Mining Engineers, and Member of some of the other Societies. I need not tell you that he is a very broad-minded man, and we would be very glad to hear from him.

W. L. SAUNDERS, M. AM. SOC. C. E., PAST-PRESIDENT, AM. INST. MIN. ENGRS.—I had hoped that Chairman Herschel, in introducing me, might define what a mining engineer really is. In this respect we labor under a disadvantage, as compared with the Civils, Mechanicals, and Electricals. The answer to the question, "What is a mining engineer?", is a difficult one.

I was once asked the following question: "If one goes digging for clams is it mining or fishing?" Professor Kemp, of Columbia, whom we all know as a distinguished mining engineer, was present when I asked this question of a large audience of engineers. Some months afterward the Professor was examining some mining properties out

West. From one of these camps he wrote me that ever since I had asked the question he had been trying to answer it and was now prepared to do so. He said, "The real answer is: The mining engineer is the clam."

The American Institute of Mining Engineers bears a somewhat different relation to its Sections than do the other National Societies. Dr. Hunt said, a moment ago, that the desirability and importance of a Section of the American Society of Civil Engineers was increased in proportion to its distance from New York. This does not apply to the Institute of Mining Engineers because of the specialties involved. Some mining engineers work underground in mines, some in the class known as precious metals, such as gold and silver, others in mines of iron, copper, etc. Then, we have metalliferous and non-metalliferous mining. Coal mining, for instance, is one of our largest industries. We have metallurgists who are classed as mining engineers, but whose work is done in the mills.

Through Local Sections our members who are interested in special departments of the mining industry get together in groups, the proceedings and deliberations bearing particularly on that special industry. One of our largest Sections, and perhaps the largest, is the Anthracite Section, at Wilkes-Barre, Pa.

The Institute inaugurated the local section policy about five years ago. We have to-day fifteen Sections, our experience being that a Section is an element of strength, adding a limb to the main body and contributing toward the general interest and prosperity of the Institute. Through Sections the membership is largely increased.

Another advantage derived from Local Sections is that the influence of the Institute may be used through its Sections to benefit the mining industry as it affects different parts of the country. For instance, I was at Reno, Nev., in September, 1915, in connection with my office as President of the Institute. The mining men there asked me what they could do through the Institute to influence mining conditions in the State. I told them that if they had a Local Section the Institute would be in a position to consider a proposition made by it bearing on any subject relating to the Engineering Profession, and that if requested by the Section the Institute would be very likely to authorize a certain line of action. Such a precedent was recently established when the Directors of the Institute were asked to favor changes in the Constitution of the State of New York. They gave power to the New York Section, which enabled it to use the influence of the Institute, through the Section, in advocating these changes.

Recently, the President of the Mining Institute of Mexico wrote to me asking for financial help, because of the extended revolution down there, which had so affected certain members of the Institute in good standing as to prevent them from keeping up their dues. The matter

was referred to the Directors of the American Institute, and authority was given to organize a Mexican Section, taking over the members of the Mexican Institute in good standing. This was done and is now in effective operation.

Following are our rules governing Local Sections:

XVIII. LOCAL SECTIONS.

"Sec. 1. A Local Section of the Institute may be authorized by the Board at the written request of ten Members residing within an appropriate distance of a central point.

"Sec. 2. The Board shall define the territory of a Section.

"Sec. 3. Only one Section shall be authorized in one locality or district.

"Sec. 4. A Section must consist of at least twenty-five members; if its membership falls below twenty-five in number, the Board may annul the Section.

"Sec. 5. Only Members and Associates of the Institute shall be members of its Local Sections.

"Sec. 6. All Members and Associates of the Institute residing within the territory of a Section shall be eligible for membership in such Section. But any such person failing within three months, after due invitation, to become a member of such Local Section, shall thereafter be admitted to its membership and privileges only on such conditions as said Local Section shall determine. * * *

"Sec. 7. The officers of a Section shall be elected, after the formation of the Section has been duly authorized, at a meeting of the members of the Institute within the territory of said Section, called by the sponsors of the Section, notice of said meeting and its objects being given to said Members at least thirty days in advance. Officers of Local Sections shall be elected for a term not longer than one year.

"Sec. 8. The Officers of a Local Section shall be a Chairman, Vice-Chairman, Secretary, Treasurer (or Secretary-Treasurer), and such others as the Section may desire.

"Sec. 9. It shall be the policy of the Board of Directors of the Institute to contribute from its funds for the necessary running expenses of each Local Section, when and so far as practicable, an amount not exceeding, in each year, twenty-five per cent. of the dues received from the members of said Section in said year, but in no case exceeding the sum of two hundred and fifty dollars. Requests for such appropriation shall be signed by the Chairman, Secretary and Treasurer of the Section.

"Sec. 10. If the expenses of a Section exceed the appropriation made by the Board, the difference may be made up by voluntary contributions from the members of said Section, if it shall so determine. The Institute shall not be responsible for the debts of any Section. * * *

"Sec. 11. The Board reserves the right to cancel a Section, or readjust its territory.

"Sec. 12. Papers presented at Local Sections, and discussions thereon if reported, shall be the property of the Institute. They shall be submitted to the Publication Committee and published in the *Bulletin* or *Transactions* or both, if approved. Such papers shall not be pub-

lished elsewhere *in extenso* without permission of the Board. The reading of a paper before a Local Section shall not carry with it the right of publication in the *Bulletin* or *Transactions* of the Institute.

"Sec. 13. Neither the author of a paper presented to a Local Section nor the Local Section shall have the right to reprint a paper or publish it in advance of the meeting without obtaining the permission of the Publication Committee of the Institute, which may refuse, or determine the details of such permission. Nothing herein shall forbid the abstracting of a paper by the press after its presentation before a Local Section.

"Sec. 14. The Institute shall print advance copies of papers offered to Local Sections, in order to facilitate discussion thereon, provided that such papers are approved for such advance publication by the Chairman or Secretary of the Local Section and by the Publication Committee of the Institute.

"Sec. 15. Papers read before a Local Section may also be offered for reading or discussion at general meetings of the Institute, and shall be given equal standing with the other papers on the program of said meeting, when approved by the Publication Committee.

"Sec. 16. Each Local Section shall transmit promptly to the Secretary of the Institute announcements of its proposed meetings and an abstract of its proceedings, including the names of authors and titles of all papers read before it, for the purpose of preparing a report thereon to be published in the *Bulletin* of the Institute, and for the purpose of enabling the Board of Directors to comply with sections 17 and 18 of these regulations.

"Sec. 17. The By-Laws and regulations of Local Sections shall be subject to the approval of the Board of Directors.

"Sec. 18. No action shall be taken by a Section which shall contravene the Constitution and By-Laws of this Institute."

The policy of the Institute has been to invite representatives from the Local Sections, who may be visiting New York, to attend the meetings of our Executive Committee and Board of Directors. This is particularly true of the Directors' meetings. We have felt that there is a difference between a Directors' meeting, acting on questions relating to the Engineering Profession, in an industry that is not in business for profit, and that of the usual Board of Directors of a corporation. The advice given by members of the Institute coming from different sections of the country has been wholesome and beneficial. It brings them in touch with the policy and the officers of the Institute, and it brings the management in touch with the special conditions which exist in different sections of the country. We have encouraged the sections to send their officers to the Annual Meetings. Recently, a resolution was adopted by our Board by which the Institute agrees to pay the transportation expenses of all the Secretaries of the Sections to the Annual Meeting of the Institute. These Secretaries get together, exchange ideas, and make reports on their return home.

THE SECRETARY.—Mr. Chairman, I suggest that, as we have a number of our members present, who represent some of our local associations, that they be called upon for their views as to the things that those associations want, and the difficulties that they have. I suggest that Professor Marx, being the farthest off, both in this room and geographically, be called upon first.

THE CHAIRMAN.—We would be very glad to hear from Professor Marx.

C. D. MARX, PAST-PRESIDENT, AM. SOC. C. E.—Mr. President and members of the Society, there is comparatively little, it seems to me, that can be added to what has been said already in favor of co-operation. We are all aware, I think, that a problem of that kind, of National importance, is before the membership at the present time.

I sincerely trust that the problem will be solved along the lines recommended by our President, who, unfortunately, is not able to be with us to-night. I think Point A, which he has emphasized, or Division A, should be carried out. When it comes to the local organizations I feel, as Mr. Lincoln, Mr. Jacobus, and Mr. Saunders have said, that they should be given the fullest possible latitude in solving their own problems. Our Local Associations should, to my mind, co-operate to the fullest extent with the local branches of the various National organizations, and with the local branches of the other scientific associations, which may happen to exist in that community. It is merely extending, as President Corthell suggests, the same idea, which we hope to carry out on National lines, to local affairs and conditions.

The San Francisco Association, as was stated, was one of the first to be organized. We had then a somewhat moribund society, which, at one time, was very strong, indeed, the Technical Society of the Pacific Coast.

The establishment of the Local Association of Members of the American Society of Civil Engineers has led, I think, to the disappearance of that particular Society; but it was on the down grade at the time, and I hardly think that the establishment of our Local Association can be taken to task for that. Since that time both the Mechanical Engineers and the Electrical Engineers have established their own branches; and, at present, there is on foot a very strong movement to bring about the co-operation of which the others have spoken.

There has been, furthermore, in San Francisco an Engineers' Club to which, of course, all members of the various societies are eligible; but, at the same time, provision has been made that those members of the National Societies, who do not happen to be members of the Engineers' Club, can be given the privileges of the club on the evening

on which the various organizations hold their special technical meetings.

In the past we have met, as others, at hotels, have had our dinner, our good social time, and have read papers. We have discussed papers furnished by the National Society, or those prepared specially by members of the Local Association; but we are working in the direction of this co-operation which seems to have been so very successful in other organizations.

The foundation of our Local Association gave us for the first time a realizing sense of what the engineer should stand for in any community. I feel sure that the founding of our Local Associations has brought the engineer into more prominence, has gained for us more respect and more regard from the public, for one thing, than we ever had before.

I think one of the most important things in connection with the local organizations is the social factor. It is good to read papers; it is good sometimes to have papers read to you, but I think it is far better that the men who are doing the work of the world to-day should be brought together into common contact. You cannot know a man and not like him as a rule, and the fact that, in the past, we have not had the opportunity of knowing our fellow members, of knowing our fellow engineers, working along other lines, has, to my mind, been a serious detriment, and has prevented that recognition of the engineer on the part of the community, which engineers were not even willing to extend to one another.

I, therefore, most heartily believe in carrying out this spirit of co-operation, and I trust that the ballot which will be counted in June will prove that the membership of the American Society believes, not only in co-operation in local affairs, but in co-operation along National lines.

THE CHAIRMAN.—I see a gentleman here from the Pelican State, where they also have a local association. We would be very glad to hear from Mr. Coleman.

J. F. COLEMAN, M. AM. SOC. C. E.—Mr. Chairman and gentlemen of the Society: The spirit of co-operation among engineers is surely abroad in the land. It is apparent that many members of the Profession in all branches have been giving much thought to this question, and more particularly during the current year.

As it appeals to the speaker, from the practical standpoint, co-operation among engineers might be divided into five general headings:

First.—The co-operation between the National Engineering Society and its members, more especially those whose residences or places of business are remote from Society Headquarters. It would appear that

this kind of co-operation may only be brought about by the local sections or chapters which have been mentioned by every preceding speaker. It is highly necessary that the co-operation between the governing board of the National Society and its members should be as complete as it is possible to make it, as otherwise the National Society cannot hope to achieve its fullest usefulness.

Second.—The co-operation of the National Engineering Societies with each other. This is hardly less important than the first kind of co-operation mentioned.

Third.—Co-operation between the National Engineering Societies and Local Engineering Societies.

Fourth.—Co-operation of Local Engineering Societies with each other; and,

Fifth.—Co-operation of local members of National Societies with each other, or, perhaps, it would be better to say co-operation between individual engineers.

The desire for co-operation of the National Engineering Society with its own members appears to be indicated by the organization of local sections or chapters.

The desire of the National Societies for co-operation with each other is shown by recent movements toward joint conference committees and similar actions.

The spirit of co-operation between National Engineering Societies and Local Engineering Societies is only beginning to make itself evident.

The same may be said of the co-operation of Local Engineering Societies with each other; and the co-operation of individual engineers with each other has heretofore been dependent on local environment or the temperament of the individual.

The speaker fully agrees with the opinion expressed by Mr. Lincoln to the effect that each particular society, and, perhaps, each particular locality, must determine for itself the best methods to adopt in order to achieve the best results from co-operation.

Experience at New Orleans and in Louisiana leads to the conclusion that, at least in that locality, the Local Engineering Society performs an important function in general co-operation.

Results there have been highly satisfactory, as far as they have gone, though it is realized that there is room for much progress in the future. The Louisiana Engineering Society was organized 19 years ago, with 25 members. It now has 250. Its membership includes all members of the National Engineering Societies who are in Louisiana. The spirit of co-operation and feeling of close camaraderie and good fellowship which has established and maintained itself between the members of that Society is worthy of just pride, and through that spirit the members of each National Society who are

members of the local society have been drawn closer to each other and to their brother engineers generally, until there is quite an effective co-operation between all of them, and especially in so far as local affairs are concerned.

Every member of the Louisiana Association of Members of the American Society of Civil Engineers is a member of the Louisiana Engineering Society, and the American Society of Mechanical Engineers is also well represented in the local society. Now, if some practical plan may be evolved whereby the Louisiana Engineering Society may enter into active co-operation with other local societies and the National Societies, it will surely receive the earnest and loyal support of that Society. Such a general co-operative movement would make the Societies more useful to their members, to the communities in which they are established, and to the Nation.

It is to be hoped that the discussion which is now being pursued by all these Societies, both National and local, will eventuate in some good plan whereby this much to be desired result may be accomplished.

THE CHAIRMAN.—Gentlemen, right in the middle of this great country is the Great Mississippi Valley. We have a representative from that valley here, Mr. Jonah, of St. Louis. We would be very glad to hear from him.

F. G. JONAH, M. AM. SOC. C. E.—Mr. Chairman and gentlemen: I just want to say a word about the Local Association of the American Society of Civil Engineers in St. Louis and the Engineers' Club of St. Louis, through which we very effectually secure a great measure of co-operation between the different branches of the National Societies in that neighborhood.

Our Local Association of Members of the American Society of Civil Engineers numbers about 120. We are working under a brief constitution which was outlined by Dr. Hunt. We have meetings occasionally; when any subject arises that we think demands our consideration, we meet to discuss it, which enables us to vote intelligently on propositions affecting the National Society.

We present no papers at our local meetings. They are presented by The Engineers' Club, which Club is composed of the members of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, and the American Institute of Electrical Engineers. The architects are not in with us. Each society presents its papers before the Club. The Club maintains a *Journal*, in which they are published, together with discussions.

The meetings alternate under the auspices of first one Society and then the others; and, in fact, the election of officers in a measure

alternates. This year, for instance, the President of the Club is a Mechanical Engineer. Next year he will probably be an Electrical Engineer, the next year a Civil, and so on.

We make our appeal to the public through The Engineers' Club, and it is very much more effectual than if we tried to make it through our Local Association of a smaller membership. For instance, if a measure comes up affecting the welfare of the City, we endorse it as The Engineers' Club, and it carries a great deal of weight—we flatter ourselves that it does.

Our Club now contains 532 members, the leading members of the four National Societies in our City. I believe in strong local associations of the different National Societies. I believe in having them grouped in a club, as we have in St. Louis and elsewhere.

I am not convinced of the necessity or advisability of making district organizations of these local associations to serve as intermediaries between the Local Associations and the National Societies. It strikes me that, possibly, if that were effected, either the local club or the National Society might suffer by the attention that might be given to these district organizations.

I think that the tendency of the day is to organize too many societies, publish too many journals, have too many meetings; and it is a characteristic of the American people that "where two or three are gathered together", they want to organize some kind of society—witness the new Order of the Broken Hammer, referred to by a previous speaker.

THE CHAIRMAN.—A veteran of this work is Mr. Bontecou, of Kansas City. I hope he will tell us what he knows of the work in Kansas City.

D. BONTECOU, M. AM. SOC. C. E.—It occurs to me that there is after all no safety in a back seat. I am a little bit uncertain as to why I should be asked to speak on the subject of local associations, unless it be, as I learned yesterday, that I was connected with the first one formed, the association at Kansas City; but there should not be very much rejoicing over the birth of that association, because I feel that it was still-born. It elected, with great enthusiasm and great unanimity, perhaps one hundred engineers as members, framed a constitution, and then did not come to any meetings; and so the association of Kansas City had to be thrown into the scrap-heap.

There may be some consolation in that, because I believe we all appreciate that even a scrap-heap is instructive, and perhaps the lesson we are to draw from that is a pretty broad one, that it meant that there was lack of appreciation, lack of interest, and lack of cohesion among the members, and probably lack of pretty much everything else that would cause a healthy and long life.

I think the situation at Kansas City is interesting in a way. In the thirty years that I have known the town the engineers have always shown a desire for some sort of association, and they have undertaken pretty nearly all the unfortunate things that could be undertaken by a body of engineers to that end and tried them out, and each has failed.

There was, in the first place, an engineers' club that could not pay its rent, and there was an engineers' club that followed that insisted upon dealing with purely national questions. It spent its time considering recommendations to Congress, and things of that kind. And then there was a technological association which depended entirely upon getting some eloquent outsider to address it at its meetings; but the supply of eloquent men soon ran out, and there was nothing left. And then there was this association that I spoke of; and now there is an engineers' club which has been groping along in more or less trouble; and I gather from what I know of it that it is not exactly in a flourishing condition. It has reached a point where the members of the American Society of Civil Engineers are quite seriously considering the propriety of forming an Engineers' Branch of this Society, where engineers may go and say or hear something that relates in some way or other to engineering.

The effect of it to me is quite evident; and I do not know how the situation ought to be met. I hoped to hear something that would help me to a conclusion to-night. For instance, not very long ago, an engineer said to me, why is it that one engineer always knocks another engineer, and he honestly felt that what he said was true. I do not know whether it is or not; I do not believe it is; but probably there are too many occurrences that suggest it.

Of course, the difficulties are great in a place where there are not a large number of engineers, where only 25 or 30 men can be depended upon for the total membership, and where many questions are to be considered, as, for instance, that of expense, of a place to meet, and the dread some people have of going to a meeting where they may have to sit through a paper that is dreary. They have trouble enough the rest of the time without listening to that.

I have reached one conclusion as to the preliminaries necessary for the formation of an association, namely, on these questions of local interest that have been referred to, and think that the business of a local association is to interest itself with local questions, where its members are surer to find a common meeting ground than in any other way. Engineers can render service to the community they live in, and by doing so help their association and themselves.

THE CHAIRMAN.—I am sorry we have nobody here from Boston to speak to us on this subject. I happen to know that it is a very live community in the matter of local associations of engineers, all of them working together.

A MEMBER.—I see Professor Swain at the back of the room.

THE CHAIRMAN.—Do you? I was looking for him. Professor Swain, please come forward. That is one of the advantages of the back seat that was alluded to a moment ago. I had not seen him. We will be very glad to hear from Professor Swain.

GEORGE F. SWAIN, PAST-PRESIDENT, AM. SOC. C. E.—Mr. Chairman and gentlemen, I was in hopes that you had not seen me, and that nobody else had seen me, because I have really nothing to add to what has been said this evening, to all of which I have listened with a great deal of interest, and with which I cordially agree. We are all members of one profession, not of several; and we can make our influence most felt, of course, by the highest degree of co-operation. It is not very profitable to reflect on what we would have done under other conditions, but I have sometimes considered what would have been the best organization of our engineering societies, if they had been established at one time, at this present time, for instance. We have grown up in a hap-hazard sort of way by differentiation of the various branches of engineering; but I have come to the conclusion that if I were asked to-day to organize the Engineering Profession, I would have but one society, one society of American Engineers, including all branches of the Profession, with sections and local associations, so that the different members could discuss the technical subjects in which they were specially interested, just as they do to-day, but not as separate societies.

It has occurred to me, in listening to what has been said to-night, that there is a deeper side to all this subject of co-operation, which we all desire to bring about. The object of this is to increase the prestige and the influence of the Profession, to get for ourselves all that we can in the way of position and influence and power and wealth, if you like, and also to make our Profession of the greatest real use to the community. These are all legitimate objects, for any man or any society or any profession. Why do we want to get them, and what must we do in order to get them?

In the first place, in order to get these things we must make ourselves deserving of them. We must make the Engineering Profession worthy of the great place, the great influence, which it ought to hold in the community. We must realize that there is something besides the material side and aspect of all this question. We have duties as citizens, as individuals, in this great country, entirely aside from our duties and interests as engineers; and in meeting these we can do a great deal by co-operation. In all these respects the motto "United we stand, divided we fall," holds, not only for individuals, but for societies and for members of the different branches of the Profession.

We are products, each one of us, of our environment and our heredity, and of what has gone before. How can we influence those who are to come after us for their good? One of the great influences is education; and I fail to see that the Engineering Profession, as a profession, has done very much to influence education in this country. We take the education that is given to us, that others decide we ought to have. I think there is a great opportunity, for the Engineering Profession, in trying to influence the character of the future members of our own Profession; and I wish that we, in co-operating, could get a little apart from the mere technical details that we are so apt to discuss at our meetings, and think of the deeper things, of which education is only one.

Now, we as engineers tend to become materialistic. We are applied scientists. We deal with the applications of the laws of Nature, and with the materials of Nature, and the study of these naturally tends to make a man materialistic, and to divert his thoughts from the deeper things. We must work against this tendency. We must not allow ourselves as workers in material things, to be removed from the real deep things of life.

We realize this to a certain extent. We have codes of ethics, and so forth, and we realize that we have certain ethical relations and duties; but codes of ethics will do no good if we excuse or connive at, or fail to treat with seriousness, flagrant violations of those codes. We must realize in all of this discussion of co-operation and of what we are trying to do to increase our influence, our prestige, our power, our representation, that there is a moral and an ethical side to the whole question, which is much more important than the material side.

THE CHAIRMAN.—Having now exhausted the draft, I will call for volunteers, and will be very glad to hear from anybody on this general subject of sections or local associations.

THE SECRETARY.—Mr. Chairman, I would like to suggest that you have not exhausted the draft, for Mr. Crocker, of Denver, the first President of the Colorado Association, is here.

THE CHAIRMAN.—I had forgotten Denver. Mr. Crocker, we would be very glad to hear from you.

H. S. CROCKER, M. AM. SOC. C. E.—Mr. President and gentlemen, before I came here to-night, Mr. Hunt made me a promise that I would not be asked to say anything, so I am not prepared to say very much. The Colorado Association, as has been said, was organized in 1908, and we had at the start 53 members. We now have a total of about 75 members out of a membership in the State of Colorado of about 104.

The Association has been very successful, especially in making the members acquainted with each other, and with the work that is

done by each. I think that we are working together much better than we ever did before. Lately, we have been confronted with a question, to which we will have to give considerable thought, that is, the arrangement which we may be able to make for co-operation with the local branches of other societies. Prior to the organization of our Association there existed in Colorado the Colorado Scientific Association, which, at the present time, has about 225 members. This has decreased somewhat since the organization of the branches of the National Societies, and the Scientific Association has taken the initiative in suggesting some form of co-operation, by which we will have joint meetings and possibly joint headquarters, with some kind of common organization.

The greatest problem with us is the question of expense. When we organized our Association we decided on yearly dues of \$2, which are rather small for any organization, barely covering postage and notices; and, as is known, it has not been the policy of our Parent Society to rebate to any of our local members a portion of their dues on account of their belonging to local associations. I do not know that that is desirable, but, as it is now, of this Colorado Scientific Association there are 60 members belonging to these various societies, and we must devise some means of arranging for joint meetings.

The first meeting we had was last Saturday night. It was conducted by the local members of the Institute of Electrical Engineers. It was one of the most successful meetings we have had. The subject under discussion was "Railroad Electrification". The attendance was about 75, which was unusually large for one of our meetings, and the enthusiasm was accordingly great. A programme was given, so that I think that all our members will feel that we will do much more in the line of joint meetings. I consider it a great privilege to have been present to-night and to have heard the gentlemen who represent the other Societies, because, in Colorado, we certainly want to go in with the local members of those Societies, and do all we can to get acquainted and work together.

THE SECRETARY.—Mr. Chairman, I just happened to see in the room Mr. John Bogart, who was Secretary of this Society before any of the other National Societies, with the exception, I think, of the Mining Engineers, were formed. He may have some ideas to express on this subject.

THE CHAIRMAN.—Mr. John Bogart.

JOHN BOGART, M. AM. SOC. C. E.—Mr. Chairman and gentlemen, it seems to me that this subject has been so thoroughly discussed this evening that there is very little to be added. I was the Secretary of this Society before any of the other National organizations were formed, except the Mining Engineers. In fact, I helped in the organi-

zation of the Mechanical Engineers, and it was effected largely in the office of the Secretary of the American Society of Civil Engineers. The organization of the American Institute of Electrical Engineers was also effected in my office, when I was Secretary of the American Society of Civil Engineers; and I was very glad to be able, in each of those cases, to help with such advice as was possible, the men who felt that it was important to organize those special societies.

All through my connection with the Board of Direction of the American Society of Civil Engineers—which was a good many years, not only as Secretary, but also as a Director—this matter of what could be done to have some local meetings of interest, and to take care of members of the Society at all points in the United States, was discussed and was thought of very much indeed. It seems to me that the organization of these local sections, as has been outlined here and has been going on, is a wonderful step in advance toward the realization of the best interests of the Profession.

I was deeply interested in what Professor Swain said, with which I most heartily agree. I wish it had been possible that there should have been, instead of these different National Societies, one great National Society, in which each of the different branches of the Profession would have its equal part; and possibly the association of local organizations may lead to a much better realization of that ideal than has been attained up to this time.

* * * * *

OTIS F. CLAPP, M. AM. SOC. C. E.—Mr. Chairman, I move that the discussion that is now before us be published by the Society, after proper revision.

THE CHAIRMAN.—Mr. Clapp moves that the discussion here to-night be published in the *Proceedings* of the Society.

(Motion seconded.)

THE CHAIRMAN.—All in favor of the motion say "Aye"; contrary minded, "No". It is a vote.

THE CHAIRMAN.—If there is no further business, a motion to adjourn will be in order, but first let me express our thanks to the gentlemen who have addressed us this evening.

Adjourned.

SOCIETY ITEMS OF INTEREST**Admission Requirements****Rules Adopted by the Board of Direction in Regard to
Requirements for Admission to the Various Grades of
Membership in the Society, April 18th, 1916***

The requirements fixed by the Constitution are intended to mark the minimum which should be recognized for admission to membership, and the maintenance of a high standard necessitates that these provisions should be interpreted conservatively to the end that the fitness of applicants shall be established beyond a doubt.

In order to shape more definitely the requirements in the classification of applicants for admission or for transfer, and to assure as far as possible that applicants for membership meet the spirit of the requirements established by the Constitution, it is the sense of this Board that:

(1) No applicant shall be admitted to any grade whose qualifications are not shown to be clearly equal to the requirements of the Constitution.

(2) In order to insure the fulfillment of these requirements, each applicant for admission or for transfer shall be required to furnish, if possible, the names of persons, whether members of the Society or not, who have personal knowledge of his work in each of the positions enumerated in his application. If possible, he shall name more than five references, and his application shall state in detail the character and extent of the works upon which he has been engaged, and the degree to which he was responsible for their design and execution.

(3) In considering the requirements for the grade of Member the words "responsible charge of work" shall be interpreted to refer to work of considerable magnitude for which rule-of-thumb methods are not sufficient.

* In spite of the most careful scrutiny of all applications, criticism of the action of the Board in specific cases (that it has either been too lenient or too severe), has been heard. The above rules were the result of very full consideration of the subject, the object being to render as uniform as possible the treatment of all applications.

These rules should be substituted for those previously issued and printed on page 35 of the Year Book for 1916.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

June 7th, 1916.—8.30 P. M.—This will be a regular business meeting. Two papers will be presented for discussion, as follows: "The Preservation of Sandy Beaches in the Vicinity of New York City", by Elliott J. Dent, M. Am. Soc. C. E.; and "The Properties of Balsa Wood (*Ochroma Lagopus*)", by R. C. Carpenter, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

September 6th, 1916.—8.30 P. M.—A regular business meeting will be held, and a paper by J. C. Allison, Assoc. M. Am. Soc. C. E., entitled "Control of the Colorado River as Related to the Protection of Imperial Valley", will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-eighth Annual Convention of the Society will be held at Pittsburgh, Pa., from June 27th to 30th, 1916, inclusive.

Arrangements for the Convention are in the hands of the following Local Committee:

GEORGE S. DAVISON, *Chairman*,

J. A. ATWOOD,

D. W. McNAUGHER,

R. A. CUMMINGS,

EMIL SWENSSON,

RICHARD KHUEN,

E. B. TAYLOR,

MORRIS KNOWLES,

W. G. WILKINS,

PAUL L. WOLFEL.

A circular containing information as to the general programme, transportation, hotel rates, etc., has been issued to the membership.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be per-

formed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

It sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at

6 P. M., at the Palace Hotel, on the third Tuesday of February, April, June, August, and October, and the third Friday of December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, L. R. Hinman, 1400 West Colfax Ave., Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., at Clarke's Restaurant, 1632 Champa Street.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meetings).

March 11th, 1916.—The meeting was called to order at the Denver Athletic Club; President John E. Field in the chair; L. R. Hinman, Secretary; and present, also, 19 members.

The minutes of the meeting of February 12th, 1916, were read and approved.

On motion, duly seconded, the resignations of Messrs. Orrin Randolph and William A. Smith, as members of the Association, were accepted.

On motion, duly seconded, the resolutions on the death of George Lenox Crawford, Assoc. M. Am. Soc. C. E., were adopted and ordered spread upon the records of the Association. A copy of the resolutions was also ordered to be sent to his family.

The discussion of the six questions submitted to the membership of the Society by the Committee on Revision of the Constitution, was opened by Messrs. Ridgway, Toll, Comstock, Vincent, Ketchum, and Follansbee, to whom they had been assigned, and the subjects were generally discussed by those present.

A letter from John A. Ockerson, Past-President, Am. Soc. C. E., relative to the change of Society headquarters, was read, but owing to lack of time discussion was deferred until some future meeting.

Adjourned.

April 15th, 1916.—The meeting was called to order at the Denver Athletic Club, and was held in joint session with the Local Chapter of the American Institute of Electrical Engineers; President Carter of that Chapter in the chair; L. R. Hinman, Secretary; and present, also, 70 members and guests.

President Field of the Association, introduced Charles D. Marx, Past-President, Am. Soc. C. E., and Edwin Duryea, Jr., Director, Am. Soc. C. E., the guests of the Association.

Mr. H. S. Crocker, who was recently appointed to represent the Society on the Colorado Committee on Industrial Preparedness, addressed the meeting briefly on the duties of that Committee.

Mr. W. H. Edmunds, of the Denver and Interurban Railroad, presented a paper on "Steam Railroad Electrification", illustrating his remarks with lantern slides, and the subject was generally discussed by those present.

Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club, Atlanta, Ga.

Regular monthly luncheon meetings are held to which visiting members of the Society are always welcome.

(Abstract of Minutes of Meeting)

April 11th, 1916.—The meeting was called to order, the guest of the evening being George C. Scales, Assoc. M. Am. Soc. C. E., Highway Engineer, U. S. Office of Public Roads and Rural Engineering.

The minutes of the previous meeting were read and approved.

The following officers were elected for the ensuing year: President, Paul H. Norcross; First Vice-President, V. H. Kriegshaber; Second Vice-President, William C. Spiker; and Secretary-Treasurer, Thomas P. Branch.

It was the consensus of opinion that the Local Association, as a body, approved of the removal of the headquarters of the Society to the United Engineering Building, the details being subject to the approval of the Board of Direction.

Local problems pertaining to the State Highway Commission, City Plan schemes, and Sanitary Laws, were subjects of general discussion by those present.

Adjourned.

Baltimore Association

The Baltimore Association of Members of the American Society of Civil Engineers was organized on May 6th, 1914, and the proposed Constitution was approved by the Board of Direction at its meeting of September 2d, 1914.

At the meeting of the Association on May 5th, 1915, the following officers were elected: President, Thomas D. Pitts; Secretary-Treasurer, Charles J. Tilden; Directors, J. E. Greiner, C. W. Hendrick, B. P. Harrison, B. T. Fendall, Mason D. Pratt, R. Keith Compton, R. B. Morse, and H. G. Shirley.

Cleveland Association

The proposed Constitution of the Cleveland Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on January 6th, 1915.

At the meeting of the Association on December 18th, 1915, the following officers were elected for the ensuing year: President, Robert Hoffmann; Vice-President, Wilbur J. Watson; and Secretary-Treasurer, George H. Tinker.

Louisiana Association

At the meeting of the Louisiana Association of Members of the American Society of Civil Engineers (New Orleans, La.), on April 14th, 1915, the following officers were elected for the ensuing year: J. F. Coleman, President; W. B. Gregory and A. M. Shaw, Vice-Presidents; Ole K. Olsen, Treasurer; and E. H. Coleman, Secretary.

Northwestern Association

The proposed Constitution of the Northwestern Association of Members of the American Society of Civil Engineers (St. Paul and Minneapolis, Minn.) was considered and approved by the Board of Direction of the Society on November 4th, 1914.

The officers of the Association are as follows: President, W. L. Darling; First Vice-President, George L. Wilson; Second Vice-President, L. W. Rundlett; Secretary, R. D. Thomas; and Treasurer, A. F. Meyer.

Philadelphia Association

The meetings of the Philadelphia Association of Members of the American Society of Civil Engineers are held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

The officers of the Association are as follows: President, Edward B. Temple; Vice-Presidents, Edgar Marburg and John Sterling Deans; Directors, J. W. Ledoux, H. S. Smith, Henry H. Quimby, and George A. Zinn; Past-Presidents, George S. Webster and Richard L. Humphrey; Treasurer, S. M. Swaab; and Secretary, W. L. Stevenson.

(Abstract of Minutes of Meeting)

April 3d, 1916.—The meeting was called to order at the Engineers' Club of Philadelphia; President Edward B. Temple in the chair; W. L. Stevenson, Secretary; and present, also, 40 members and guests.

The appointment of Mr. C. W. Thorn, as Assistant Secretary, was announced.

Dr. Edgar Marburg reported briefly *in re* the licensing of structural engineers.

The origin and purpose of the proposed "District Organizations" were described by Mr. Richard L. Humphrey, and the following resolution was adopted unanimously:

"Resolved: That this Association reiterates its endorsement of February 24th, 1915, of 'District Organizations' as proposed by the Conference of Presidents of the Local Associations held on January 19th, 1915, and instructs the Secretary to request our membership to vote for the revision of the Constitution of the Society to provide for 'District Organizations' and to notify the other Local Associations of this action and to request the favorable consideration of this matter by each of the other Associations and their members."

President Temple was elected as the representative of the Association on the Board of Directors of the Engineers' Club.

Clemens Herschel, Vice-President, Am. Soc. C. E., addressed the meeting on the proposed change of Society headquarters. Letters and telegrams from members of the Society in favor of and opposed to the proposition were read, and the subject was discussed by Messrs. E. J. Mehren, Charles Whiting Baker, and many members of the Association present.

After discussion, the following form of resolutions, which had been endorsed by the Board of Directors, was adopted unanimously:

"Whereas, An unofficial circular letter, dated February 12, 1916, addressed to 'the Members of the American Society of Civil Engineers,' has been sent to the Philadelphia Association of Members of the American Society of Civil Engineers, and to each of the fourteen other Local Associations of the American Society of Civil Engineers, by its author, Mr. J. A. Ockerson, Past-President of the Society; and

"Whereas, This letter contains the following statements:

"An invitation has been extended to the American Society of Civil Engineers to enter 'the United Engineering Society as an additional Founder Society.' This invitation itself shows that the destinies of the 'Founder Societies' is largely if not wholly controlled by a superior authority, and the fact must not be overlooked that the relationship which exists between the United Engineering Society and the Founder Society which gives the former authority over them, has not been presented in detail to our members.

"Suppose we become an 'additional Founder Society' and desire to put before the public a measure which we have conceived and which we deem important. It must have the sanction of the United Engineering Society, representing a majority of the Founder Societies, which can prevent action, or, if approved, the United Engineering Society would stand before the public as the sponsor of the measure. This illustration applies equally to all of the Founder Societies;" and

"Whereas, It appears from the results of inquiries in authoritative quarters that these statements have no basis in fact, and that they are, therefore, calculated to influence unfairly votes on the pending measure by which the American Society of Civil Engineers has been given an opportunity to become one of the Founder Engineering Societies in relation to the United Engineering Society; be it hereby

"Resolved, As the sense of this meeting, that this situation be brought promptly to the notice of the Board of Direction of the American Society of Civil Engineers through these resolutions, and that it be recommended to the Board, in the interest of fair play in a matter of momentous importance to the Society, that the Board issue an announcement to the membership-at-large, and at the earliest possible date, in official certification to the correctness or incorrectness of Mr. Ockerson's previously-quoted statement."

A vote of thanks to Messrs. Herschel, Mehren and Baker was passed.

Adjourned.

Portland, Ore., Association

At the Annual Meeting of the Association on September 28th, 1915, the following officers were elected for the ensuing year: President, J. P. Newell; First Vice-President, John T. Whistler; Second Vice-President, E. B. Thomson; Treasurer, Russell Chase; and Secretary, J. A. Currey.

St. Louis Association

The proposed Constitution of the St. Louis Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on October 7th, 1914.

The following officers have been elected: President, J. A. Ockerson; First Vice-President, Edward E. Wall; Second Vice-President, F. J. Jonah; Secretary-Treasurer, Gurdon G. Black. The meetings of the Association are held at the Engineers' Club Auditorium.

San Diego Association

The San Diego Association of Members of the American Society of Civil Engineers was organized on February 5th, 1915, and officers have been elected, as follows: President, George Butler; Vice-President, Willis J. Dean; and Secretary-Treasurer, J. R. Comly.

At its meeting of September 20th, 1915, the Board of Direction considered and approved the proposed Constitution of the San Diego Association of Members of the American Society of Civil Engineers.

Seattle Association

The Seattle Association of Members of the American Society of Civil Engineers was organized on June 30th, 1913.

The officers of the Association for 1916 are as follows: President, A. O. Powell; Vice-President, Joseph Jacobs; and Secretary-Treasurer, Carl H. Reeves.

(Abstract of Minutes of Meeting)

April 24th, 1916.—The meeting was called to order at 12.15 p. m., at the Northold Inn; President A. O. Powell in the chair; Carl H. Reeves, Secretary; and present, also, 15 members and guests.

The minutes of the meeting of March 27th, 1916, were read and approved.

The resignation of Mr. E. C. Macy, as a member of the Association, owing to removal from the district, was read and accepted.

Mr. G. R. Edwards was appointed a member of the Legislative Committee to succeed Mr. J. B. Warrack, resigned.

President Powell addressed the meeting on the subject of Industrial Preparedness as outlined by the Naval Consulting Board and the Secretary of the Navy, describing the plan of work by districts under the direction of the representatives chosen from the National Engineering Societies, and urging the importance of volunteer aid by members of the Association in making this industrial census.

Adjourned.

Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bi-

monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, 701 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

The officers of the Association for 1916, are as follows: President, William Mulholland; First Vice-President, H. Hawgood; Second Vice-President, L. C. Hill; Secretary, W. K. Barnard; and Treasurer, C. H. Lee.

Spokane Association

The proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on March 4th, 1914. Ulysses B. Hough is President.

Texas Association

The proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers was considered and approved by the Board of Direction of the Society on December 31st, 1913. The headquarters of the Association is Dallas, Tex. John B. Hawley is President.

MINUTES OF MEETINGS OF SPECIAL COMMITTEES

TO REPORT UPON ENGINEERING SUBJECTS

Special Committee on Stresses in Railroad Track.

January 18th, 1916.—The meeting was held at the Society House. Present, A. N. Talbot (Chairman), A. S. Baldwin, C. G. E. Larsson, and William McNab (of the Committee), and also W. M. Dawley and P. H. Dudley (of the American Railway Engineering Association).

There was an informal presentation and discussion of the results of the experimental work carried out in 1915. A report of progress was put in final form for presentation to the American Society of Civil Engineers and the American Railway Engineering Association.

March 21st, 1916.—The meeting was held at the Congress Hotel, Chicago, Ill. Present, A. N. Talbot (Chairman), A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, — Gennett (representing Robert W. Hunt), Paul M. La Bach, C. G. E. Larsson, William McNab, G. J. Ray, and F. E. Turneure (of the Committee), and also W. M. Dawley, P. H. Dudley, J. B. Jenkins, and Earl Stimson (of the American Railway Engineering Association).

The report of experimental work carried on in 1915 was presented and discussed in detail. There was a discussion of the nature of the work to be carried on during the coming season. The proposed instru-

ment of Mr. John Brunner for determining the lateral pressure against the rail was described. It was decided to hold a meeting in Champaign-Urbana to consider the results of the experimental work and the programme for the coming season.

Special Committee on Materials for Road Construction

February 5th, 1916.—The meeting was held at the House of the Society. Present, W. W. Crosby (Chairman), A. W. Dean, Nelson P. Lewis, Charles J. Tilden, and A. H. Blanchard (Secretary).

The minutes of the meeting of November 4th, 1915, were read and approved.

A communication from Charles Warren Hunt, Secretary of the Society, pertaining to appropriations for the work of the Committee, was read.

The Chairman outlined the work of the Committee for 1916, and reviewed the opinions expressed at the Annual Meeting, relative to broadening the scope of the work of the Committee.

A resolution was adopted to the effect that although the Committee does not believe it to be expedient, practicable or consistent with the general policy of the Society to frame detailed specifications for the different types of roads and pavements, it proposes to include in its next report the fundamental considerations which should govern the framing of such specifications and which might even be included in them, and a copy of the resolution was ordered to be forwarded to the Board of Direction.

On motion, duly seconded, the Chairman was authorized to make assignments of the several sections of the 1917 Report to the various members of the Committee.

It was decided that the next meeting of the Committee should be held during the latter part of April, 1916.

April 22d, 1916.—The meeting was called to order at 10 A. M., at the House of the Society. Present, W. W. Crosby (Chairman), H. K. Bishop, Nelson P. Lewis, Charles J. Tilden, George W. Tillson, and A. H. Blanchard (Secretary).

The minutes of the meeting of February 5th, 1916, were read and approved.

The outline and scope of the 1917 Report were discussed at length, and reports by Sub-Committees on Gravel Roadways, and Cement-Concrete, Brick, Stone Block, Wood Block, Bituminous Concrete, Asphalt Block, and Sheet-Asphalt Pavements, were considered.

It was decided that the next meeting of the Committee should be held about the middle of June, 1916, the date to be decided by the Chairman.

Special Committee on Concrete and Reinforced Concrete

March 28th, 1916.—The meeting was called to order at 10.10 A. M., at the House of the Society. Present, J. R. Worcester (Chairman), Robert W. Lesley, A. N. Talbot, and Richard L. Humphrey (Secretary).

The Report of the Sub-Committee on Ways and Means was considered, and the report of the Chairman relative to correspondence with the Secretary of the Society concerning finances was received.

The Secretary was instructed to prepare 100 page-proof copies of the report of the Committee, embodying all changes to date, to be sent to the members of the Committee in advance of its consideration at the next meeting.

The proposed recommendations for flat slab design were discussed.

The proposed survey of existing buildings was discussed by Professor Talbot, who stated that although he felt that it would give results of value, it would take time, and that probably this information would not be available for the June meeting.

It was agreed to make a survey of existing buildings for the purpose of analysis, and that such survey should include: 1, The Design; 2, The Loading; and 3, The Present Condition.

The Sub-Committee on Design was requested to formulate instructions for the work, and it was suggested that each member be asked to report on such flat slab structures as were accessible to him.

Special Committee on Steel Columns and Struts

April 6th, 1916.—The meeting was called to order at 10 A. M., at the Bureau of Standards, Washington, D. C. Present, George H. Pegram (Chairman), James H. Edwards, Clarence W. Hudson, Rudolph P. Miller, and Lewis D. Rights (Secretary). There were also present W. H. Moore, M. Am. Soc. C. E., representing the Steel Column Sub-Committee of the American Railway Engineering Association, and Dr. G. R. Olshausen, representing the Bureau of Standards. R. B. Woodworth, M. Am. Soc. C. E., of the Carnegie Steel Company, and A. B. Ilsley, Assoc. M. Am. Soc. C. E., of the Southern Railway Company, were present as invited guests.

The minutes of the meeting of January 20th, 1916, which had been previously distributed by mail to all members of the Committee, were approved as written.

Dr. Olshausen reported that he had considered the question of initial sets in connection with tests of six columns, slenderness ratio, $20 \frac{l}{r}$, Type 1, three light and three heavy sections, and that he had plotted stress strain curves for these six tests, but had not given the matter as much study as he desired. On motion, the matter of initial sets and repeated loads was referred to Dr. Olshausen, as a Committee of one, to report on at the next meeting.

Professor Swain (who was not present) was continued as a Committee of one on Watertown Tests, to confer with Col. Wheeler, of Watertown Arsenal, and report at a later meeting.

Mr. Edwards reported for the Committee on Transverse Tests, consisting of himself and Messrs. Swain and Olshausen, outlining a proposed method of making three tests with transverse loadings. The Committee was continued.

Mr. Miller reported progress on 8-in. strain gauge measurements, and was continued as a Committee of one.

The discussion of Mr. Worcester's report on Safe Working Values called attention to the fact that to date only Messrs. Edwards, Modjeski, and Rights had submitted discussions on the subject. On motion, the Secretary was instructed to request all the other members of the Com-

mittee to submit discussions at once, so that the views of all the members would be before the Committee at the next meeting.

The Committee then adjourned to witness a test on a heavy Bethlehem section column, slenderness ratio, $50 \frac{l}{r}$, and after its failure, the members were the guests of Dr. S. W. Stratton, Director of the Bureau of Standards, at luncheon.

After luncheon, the Committee discussed the wisdom at this time of arranging with the Bureau of Standards to have the Government purchase columns for additional supplementary programmes, and the subjects of special steels, transverse tests, and long columns with slenderness ratios up to $200 \frac{l}{r}$. It was decided that the work of investi-

gating and interpreting the programme, as now outlined, was sufficient to take up the time of the Committee for the present.

Relative to the plotting of the results of tests made thus far, Dr. Olshausen reported that he was making specimen tensile and compression tests covering material taken from the same heats as the columns. It was thought that these specimen tests would assist the Committee in explaining the reason for the low failure values of the heavy columns, and Dr. Olshausen was requested to arrange to plot the stress strain curves for the specimen tests alongside of those for the columns.

After examining the curves now plotted by the Bureau of Standards, the Committee adjourned at 2.30 P. M., to meet at the call of the Chair.

Special Committee on Valuation of Public Utilities

April 11th, 12th, 13th, and 14th, 1916.—Nine sessions were held at the Society House. Present, F. P. Stearns (Chairman), C. S. Churchill, W. G. Raymond, H. E. Riggs, W. J. Wilgus, and J. P. Snow (Secretary *pro tem.*).

Arrangements were made for perfecting and printing, in galley form, the table of contents; introduction; glossary; fundamental principles of valuation; property to be included in physical valuation; and original cost to date.

The chapters on Reproduction Cost, Depreciation and Appreciation, Development Expense, and Non-Physical Values, were discussed, and arrangements were made for revision and discussion before printing.

PRIVILEGES OF ENGINEERING SOCIETIES

EXTENDED TO MEMBERS OF THE

AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Electrical Engineers, 33 West Thirty-ninth Street, New York City.

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

- American Society of Mechanical Engineers**, 29 West Thirty-ninth Street, New York City.
- Architekten-Verein zu Berlin**, Wilhelmstrasse 92, Berlin W. 66, Germany.
- Associação dos Engenheiros Civis Portuguezes**, Lisbon, Portugal.
- Australasian Institute of Mining Engineers**, Melbourne, Victoria, Australia.
- Boston Society of Civil Engineers**, 715 Tremont Temple, Boston, Mass.
- Brooklyn Engineers' Club**, 117 Remsen Street, Brooklyn, N. Y.
- Canadian Society of Civil Engineers**, 176 Mansfield Street, Montreal, Que., Canada.
- Civil Engineers' Society of St. Paul**, St. Paul, Minn.
- Cleveland Engineering Society**, Chamber of Commerce Building, Cleveland, Ohio.
- Cleveland Institute of Engineers**, Middlesbrough, England.
- Dansk Ingeniorforening**, Amaliegade 38, Copenhagen, Denmark.
- Detroit Engineering Society**, 46 Grand River Avenue, West, Detroit, Mich.
- Engineers and Architects Club of Louisville**, 1412 Starks Building, Louisville, Ky.
- Engineers' Club of Baltimore**, 6 West Eager Street, Baltimore, Md.
- Engineers' Club of Kansas City**, E. B. Murray, Secretary, 920 Walnut Street, Kansas City, Mo.
- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Club of Trenton**, Trent Theatre Building, 12 North Warren Street, Trenton, N. J.
- Engineers' Society of Northeastern Pennsylvania**, 415 Washington Avenue, Scranton, Pa.
- Engineers' Society of Pennsylvania**, 31 South Front Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburgh, Pa.
- Institute of Marine Engineers**, The Minories, Tower Hill, London, E., England.
- Institution of Engineers of the River Plate**, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.

- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.
- Memphis Engineers' Club**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Mont.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Oregon Society of Civil Engineers**, Portland, Ore.
- Pacific Northwest Society of Engineers**, 312 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingenieurs Civils de France**, 19 rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.
- Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.
- Vermont Society of Engineers**, George A. Reed, Secretary, Montpelier, Vt.
- Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From April 4th to May 1st, 1916)

DONATIONS*

RAILROAD VALUATION AND RATES.

By Mark Wymond. Cloth, 8 x 5½ in., illus., 339 pp. Chicago, Wymond & Clark, 1916. \$1.50. (Donated by the Author.)

The preface states that this book is intended primarily as a treatise on the Principles of Rates and their relation to Valuation and Rate Regulation. In the first four chapters the author, it is said, has given an historical statement of facts relating to the railroads of the United States, and has discussed their promotion and construction in so far as such promotion and construction relate to capitalization and to the principles of rates and rate-making. The remainder of the book is devoted, it is said, to a discussion of the various phases of valuation and rates. The author, it is stated, has had thirty years experience in connection with the promotion, construction, reconstruction, operation, and valuation of railroads as an engineer in the service of railroad corporations, banking institutions, local communities, industrial and mining corporations, and of a traffic association, and it is hoped that this experience may give assurance to the reader as to his impartial attitude in his statements of essential facts on the subject, as contained in this book. The Contents are: Historical; Promotion; Construction-Reconstruction; Capitalization; Valuation; Rates; Rate Regulation.

IRRIGATION MANAGEMENT:

The Operation, Maintenance, and Betterment of Works for Bringing Water to Agricultural Lands. By Frederick Haynes Newell, M. Am. Soc. C. E. Cloth, 7¾ x 5½ in., illus., 13 + 306 pp. New York and London, D. Appleton and Company, 1916. \$2.00.

This book, it is stated in the preface, is an attempt to bring together, in concise form, the working ideas resulting from numerous conferences held during the past few years by members of the United States Reclamation Service and others interested in solving the problem of the proper utilization of irrigation systems after they are built and of obtaining fair returns from the irrigated land. The author has also endeavored, it is said, to answer the questions asked by irrigation managers, their assistants, and others connected with such work, with the hope of bringing about a greater degree of efficiency and economy in the operation, maintenance, and betterment of irrigation works. The general subject of irrigation and of methods of construction are not discussed herein, it is stated, because the technical side of the question has already been fully covered in other books. The early chapters of this volume were first published as separate articles in various engineering publications, and free use has also been made, it is said, of the informal reports, and particularly of the "Use Book", of the United States Reclamation Service in the compilation of the latter chapters. The Chapter Headings are: The Problems; The Physical Conditions; The Human Element; The Legal Side; Operation Organization; Methods of Operation; Records and Schedules; Water Economy; Maintenance; Expenditures, Recording and Classifying; Receipts and Values; The Irrigator and His Associations; Methods of Applying Water; The Products; Conclusions; Index.

GENERAL SPECIFICATIONS FOR CONCRETE BRIDGES.

By Wilbur J. Watson, M. Am. Soc. C. E. Third Edition. Paper, 11 x 8½ in., illus., 70 pp. Cleveland, Ohio, The Author, 1916. \$1.00. (Donated by The McGraw-Hill Book Company, Inc.).

The first edition of these specifications was published in 1908 and the second in 1910, and in order to have this, the third, edition conform to present practice radical changes in the requirements, especially in those sections devoted to quality of materials, have been made. The greatest advancement, it is stated, has been in those branches covered by the sections on Surface Finish and Waterproofing, and these sections have been entirely rewritten. The specifications are intended and have been used, it is stated, by designing engineers for railroad, municipal, and county purposes and also as a standard for the preparation and comparison of competitive designs, and the author hopes that, as the value of concrete and reinforced concrete as

*Unless otherwise specified, books in this list have been donated by the publishers.

materials of construction have been firmly established, a careful observance of specifications such as are herein presented will reduce the troubles and failures heretofore encountered in their use and lead to the careful design, selection of materials, and construction necessary to their success. The Contents are: Definitions, Classification and Loads; Rules for Computing and Designing; Working Unit Stresses; Formulas; Quality of Materials for Concrete Work; Proportioning, Mixing and Placing Concrete; Requirements for Placing Reinforcing Steel, Inserts, etc.; Placing Concrete in Cold Weather; Forms and Centers; Surface Finish; Waterproofing; Reinforced Steel Construction; Cast Stone and Blocks; Concrete Piling; Inspection and Tests; Retaining Walls, Abutments, Piers, etc.; Concrete Arches; Reinforced Concrete Slabs, Beams, Girders, Columns and Trusses; Foundations and Footings; Timber Piling; General; Cement Walks, Concrete Curbs and Roadways; Brick Pavement; Asphalt Block Pavement; Sheet Asphalt Pavement; Wood Block Pavement; Bituminous Pavement.

PARKS AND PARK ENGINEERING.

By William T. Lyle, Assoc. M. Am. Soc. C. E. Cloth, 9½ x 6 in., illus., 8 + 130 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1916. \$1.25.

Although the conception and design of a park system is the function of the landscape architect, the execution of his general plans, as well as the design of the engineering features, belongs, it is stated, to the engineer. The park engineer must be proficient, it is said, in matters pertaining to the acquisition of lands, surveying, earth excavation, masonry, road construction, under-drainage, sewerage, water supply, lighting, and bridge construction, all of which subjects are discussed in this book specifically in relation to park construction. There is also a chapter on Labor and Contracts which, it is said, will be found especially useful by city officials. The volume is intended, it is stated, for the young and inexperienced engineer of construction, but the author hopes that it will be of use to members of park associations and commissions, and by engineers and others engaged in the development of park systems and private estates. The Contents are: Desirability and Acquisition of Parks; Lands and Surveys; Design; Labor and Contracts; Construction; Index.

EARTH PRESSURE, RETAINING WALLS AND BINS.

By William Cain, M. Am. Soc. C. E. Cloth, 9½ x 6 in., illus., 10 + 287 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1916. \$2.50.

Coulomb was the first (1781), it is said, to formulate laws of friction and cohesion affecting masses of earth, and although these laws seem to have been verified by many experiments, as has been pointed out by the author in Chapter I, nevertheless, it is stated, more experiments on every kind of earth are still necessary for complete confidence. In Chapters II and III, therefore, the theory of earth devoid of cohesion is fully developed by both the graphical and analytical methods for such granular materials as clean, dry sand, gravel, and rip-rap, and in Chapter IV, the author has made numerous applications of such theory to the design of retaining walls of stone and reinforced concrete. Chapter V is devoted to earth pressures in coherent earth, surfaces of rupture, stable slopes, foundations, thrust against a retaining wall, bracing of trenches and the pressures on tunnel linings, and there is also included an independent graphical method for evaluating earth thrust. In Chapter VI, the theory of deep bins is discussed, and the author, it is said, has attempted to reach fairly good results relative to thrusts on the walls of shallow bins filled with coal. An approximate solution of stresses in wedge-shaped reinforced concrete beams is given in Appendix I, with diagrams to facilitate computation, and in Appendix II, a discussion of the results of experiments on model retaining walls is included. The Chapter headings are: Laws of Friction and Cohesion, Tables, Direction, and Distribution of Stress; Thrusts of Non-Coherent Earth, Graphical Methods; Non-Coherent Earth, Analytical Methods; Designing Retaining Walls of Stone or Reinforced Concrete; Coherent Earth; Bin Theory; Appendix I, Stresses in Wedge-Shaped Reinforced Concrete Beams; Appendix II, Discussion of Experiments on Model Retaining Walls; Index.

AMERICAN CIVIL ENGINEERS' POCKET BOOK.

By Mansfield Merriman, Editor-in-Chief; Messrs. Ira O. Baker, Arthur H. Blanchard, Charles B. Breed, Walter J. Douglas, Louis A. Fischer, George A. Goodenough, Frederic R. Harris, Allen Hazen, Frank P. McKibben, Edward R. Maurer, Rudolph P. Miller, Alfred

Noble, Frederick E. Turneure, Walter Loring Webb, and Gardner S. Williams, Associate Editors. Third Edition, Enlarged. Leather, 7 x 4½ in., illus., 9 + 1571 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1916. \$5.00.

When this Pocket Book was first published in 1911, the editors were told, it is stated, that they must select topics of interest to civil engineers, they must condense all matter and still present it clearly, and that the Pocket Book must be better and fuller than any published in the English language. These instructions were followed and the Pocket Book has become, it is stated, the chief reference work for the Profession. In this the third edition, in addition to the revision and re-setting of more than 50 pages of the second edition and the numerous other additions and changes made to bring the subject-matter up to date, a new section of 96 pages has been included, covering Harbor and River Works, by Frederic R. Harris, M. Am. Soc. C. E., Corps of Civil Engineers, U. S. Navy. The Index has also been revised and re-set, and the book now contains 41 articles, 31 tables, 103 drawings, and 120 pages more than the second edition. The Contents are: Mathematical Tables, by Mansfield Merriman; Surveying, Geodesy, Railroad Location, by Charles B. Breed; Steam and Electric Railroads, by Walter Loring Webb; Materials of Construction, by Rudolph P. Miller; Plain and Reinforced Concrete, by Frederick E. Turneure; Masonry, Foundations, Earthwork, by Ira O. Baker; Masonry and Timber Structures, by Walter J. Douglas; Steel Structures, by Frank P. McKibben; Hydraulics, Pumping, Water Power, by Gardner S. Williams; Water Supply, Sewerage, Irrigation, by Allen Hazen; Dams, Aqueducts, Canals, Shafts, Tunnels, by the late Alfred Noble and Silas H. Woodard; Mathematics and Mechanics, by Edward R. Maurer; Physics, Meteorology, Weights and Measures, by Louis A. Fischer; Steam and Electric Engineering, by George A. Goodenough and F. Malcolm Farmer; Highway Engineering, by Arthur H. Blanchard; Harbor and River Works, by Frederic R. Harris; Index, by Clinton L. Bogert.

COST ACCOUNTING: THEORY AND PRACTICE.

By J. Lee Nicholson. Second Printing. (Ronald Accounting Series.) Three-quarters Morocco, 9 x 6 in., illus., 341 pp. New York, The Ronald Press Company, 1916. \$4.00.

This volume, the preface states, is not presented as a reference book dealing with factory organization and efficiency methods, nor as presenting all that could be said on the subject of costs, the author's main purpose, it is said, being (1), to provide for the public and cost accountant a reference book dealing directly with the practical parts of cost accounting; (2) to present simply and directly, to the student, the principles and methods of cost accounting; and (3) to furnish the manufacturer with a work containing all the important practical points in connection with cost accounting, summarized and briefly explained. The Chapter headings are: Cost Finding and Its Functions; Elements of Costs; Interest in Its Relation to Cost; Principles and General Methods of Cost Finding; Methods of Distributing Indirect Expenses; Wage Systems; Recording the Material and Labor Costs; Compiling the Cost Data; Control of the Cost Records by the Financial Records; The Examination of a Plant; Devising a Cost System; Estimating Cost Systems; Departmental Systems; Special Order System Based on the Productive Labor Method; Special Order System Based on the Process or Machine Method; Product System on the Productive Labor Method; Product System Based on the Machine or Process Method; Forms Relating to Material; Production Orders and Requisitions; Time Reports and Pay-Roll Forms; Summaries of Production and Cost; Forms Relating to Finished Product; Sales and Financial Records; Index.

VALUE FOR RATE-MAKING.

By Henry Floy, M. Am. Soc. C. E. Cloth, 9½ x 6½ in., illus., 8 + 322 pp. New York and London, McGraw-Hill Book Company, Inc., 1916. \$4.00.

The preface states that notwithstanding the fact that much has been done toward defining the methods to be used and standardizing valuation procedure, various and conflicting views are still held by different authorities relative to the principles involved in determining a basis of value for rate-making. The author's purpose in this book, it is said, has been to emphasize further at least three principles which seem to him to be essential in determining a fair value for rate-making, namely, fair present value of the property used, deduction for absolute depreciation only, and the valuation of non-physical as well as physical parts of a property. There is included, it is stated, much matter that was originally prepared for the discussion of papers before engineering societies and for legal briefs and cases for

presentation before Courts and Commissions, and it is hoped that, as a whole, the book will present an orderly logical argument for the principles involved. The Contents are: Introduction; Definitions; Fundamentals in Valuation; Fair Value for Rate-Making; Cost of Reproduction; Land, Paving and Water Rights; Franchises, Working Capital and Bond Discounts; Going Value; Depreciation; Index.

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Building Construction and Superintendence. By F. E. Kidder. Pt. 2, Carpenters' Work. Ninth Edition, Revised, Rewritten and Enlarged, by Thomas Nolan. Pt. 3, Trussed Roofs and Roof Trusses. Third Edition. New York, 1915.

Diemaking and Die Design: A Treatise on the Design and Practical Application of Different Classes of Dies for Blanking, Bending, Forming and Drawing Sheet-Metal Parts, Including Modern Diemaking Practice and Fundamental Principles of Die Construction. Compiled and Edited by Franklin D. Jones. New York, 1915.

Aircraft in Warfare: The Dawn of the Fourth Arm. By F. W. Lanchester. London, 1916.

The Rise of Rail-Power in War and Conquest, 1833-1914, With a Bibliography. By Edwin A. Pratt. London, 1915.

The New International Year Book: A Compendium of the World's Progress for the Year 1915. Frank Moore Colby, Editor, Allen Leon Churchill and Horatio S. Krans, Associate Editors. New York, 1916.

R. L. Polk & Co.'s Trow General Directory of New York City, Embracing the Boroughs of Manhattan and the Bronx, 1916. New York.

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REINSTATEMENTS

MEMBERS

Date of
Reinstatement.

SCAMMELL, JOHN KIMBALL..... April 18, 1916

RESIGNATIONS

MEMBERS

Date of
Resignation.

GARRISON, EVERETT..... Dec. 31, 1915

ASSOCIATE MEMBERS

	Date of Resignation.
FRANCIS, WILLIAM.....	April 18, 1916

JUNIORS

SHERWOOD, WAKEMAN FRANCIS.....	April 18, 1916
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DEATHS

ENGSTRÖM, FRANS. Elected Associate Member, May 4th, 1892; died March 20th, 1916.

HOLBROOK, FREDERICK WILLIAM DOANE. Elected Member, October 6th, 1886; died April 13th, 1916.

NEELY, WILLIAM RIDLEY. Elected Member, July 9th, 1906; died April 11th, 1916.

PRESTON, CHARLES HENRY. Elected Member, October 5th, 1909; died April 20th, 1916.

Total Membership of the Society, May 4th, 1916,

7 925.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(April 3d, to May 1st, 1916)

NOTE.—This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- | | |
|---|--|
| (2) <i>Proceedings, Engrs. Club of Phila., Philadelphia, Pa.</i> | (30) <i>Annales des Travaux Publics de Belgique, Brussels, Belgium, 4 fr.</i> |
| (3) <i>Journal, Franklin Inst., Philadelphia, Pa., 50c.</i> | (31) <i>Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand, Brussels, Belgium, 4 fr.</i> |
| (4) <i>Journal, Western Soc. of Engrs., Chicago, Ill., 50c.</i> | (32) <i>Mémoires et Compte Rendu des Travaux, Soc. Ing. Civ. de France, Paris, France.</i> |
| (5) <i>Transactions, Can. Soc. C. E., Montreal, Que., Canada.</i> | (33) <i>Le Génie Civil, Paris, France, 1 fr.</i> |
| (6) <i>School of Mines Quarterly, Columbia Univ., New York City, 50c.</i> | (34) <i>Portefeuille Economiques des Machines, Paris, France.</i> |
| (7) <i>Gesundheits Ingenieur, München, Germany.</i> | (35) <i>Nouvelles Annales de la Construction, Paris, France.</i> |
| (8) <i>Stevens Institute Indicator, Hoboken, N. J., 50c.</i> | (36) <i>Cornell Civil Engineer, Ithaca, N. Y.</i> |
| (9) <i>Engineering Magazine, New York City, 25c.</i> | (37) <i>Revue de Mécanique, Paris, France.</i> |
| (11) <i>Engineering (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.</i> | (38) <i>Revue Générale des Chemins de Fer et des Tramways, Paris, France.</i> |
| (12) <i>The Engineer (London), International News Co., New York City, 35c.</i> | (39) <i>Technisches Gemeindeblatt, Berlin, Germany, 0, 70m.</i> |
| (13) <i>Engineering News, New York City, 15c.</i> | (40) <i>Zentralblatt der Bauverwaltung, Berlin, Germany, 60 pfg.</i> |
| (14) <i>Engineering Record, New York City, 10c.</i> | (41) <i>Electrotechnische Zeitschrift, Berlin, Germany.</i> |
| (15) <i>Railway Age Gazette, New York City, 15c.</i> | (42) <i>Proceedings, Am. Inst. Elec. Engrs., New York City, \$1.</i> |
| (16) <i>Engineering and Mining Journal, New York City, 15c.</i> | (43) <i>Annales des Ponts et Chaussées, Paris, France.</i> |
| (17) <i>Electric Railway Journal, New York City, 10c.</i> | (44) <i>Journal, Military Service Institution, Governors Island, New York Harbor, 50c.</i> |
| (18) <i>Railroad Review, Chicago, Ill., 15c.</i> | (45) <i>Coal Age, New York City, 10c.</i> |
| (19) <i>Scientific American Supplement, New York City, 10c.</i> | (46) <i>Scientific American, New York City, 15c.</i> |
| (20) <i>Iron Age, New York City, 20c.</i> | (47) <i>Mechanical Engineer, Manchester, England, 3d.</i> |
| (21) <i>Railway Engineer, London, England, 1s. 2d.</i> | (48) <i>Zeitschrift, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.</i> |
| (22) <i>Iron and Coal Trades Review, London, England, 6d.</i> | (49) <i>Zeitschrift für Bauwesen, Berlin, Germany.</i> |
| (23) <i>Railway Gazette, London, England, 6d.</i> | (50) <i>Stahl und Eisen, Düsseldorf, Germany.</i> |
| (24) <i>American Gas Light Journal, New York City, 10c.</i> | (51) <i>Deutsche Bauzeitung, Berlin, Germany.</i> |
| (25) <i>Railway Mechanical Engineer, New York City, 20c.</i> | (52) <i>Rigische Industrie-Zeitung, Riga, Russia, 25 kop.</i> |
| (26) <i>Electrical Review, London, England, 4d.</i> | (53) <i>Zeitschrift, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.</i> |
| (27) <i>Electrical World, New York City, 10c.</i> | (54) <i>Transactions, Am. Soc. C. E., New York City, \$12.</i> |
| (28) <i>Journal, New England Water-Works Assoc., Boston, Mass., \$1.</i> | (55) <i>Transactions, Am. Soc. M. E., New York City, \$10.</i> |
| (29) <i>Journal, Royal Society of Arts, London, England, 6d.</i> | |

- (56) *Transactions*, Am. Inst. Min. Engrs., New York City, \$6.
 (57) *Colliery Guardian*, London, England, 5d.
 (58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
 (59) *Proceedings*, American Water-Works Assoc., Troy, N. Y.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
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 (62) *Steel and Iron*, Thaw Bldg., Pittsburgh, Pa., 10c.
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.
 (64) *Power*, New York City, 5c.
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
 (66) *Journal of Gas Lighting*, London, England, 6d.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (68) *Mining Journal*, London, England, 6d.
 (69) *Der Eisenbau*, Leipzig, Germany.
 (71) *Journal*, Iron and Steel Inst., London, England.
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
 (72) *American Machinist*, New York City, 15c.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions*, Inst. of Min. and Metal., London, England.
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
 (76) *Brick*, Chicago, Ill., 20c.
 (77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
 (78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
 (79) *Forschungsarbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (82) *Mining and Engineering World*, Chicago, Ill., 10c.
 (83) *Gas Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., \$5.
 (90) *Transactions*, Inst. of Naval Archts., London, England.
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
 (98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$2.
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.
 (106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
 (107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
 (108) *Iron Tradesman*, Atlanta, Ga., 10c.
 (109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
 (110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
 (111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.
 (112) *Internationale Zeitschrift für Wasser-Versorgung*, Leipzig, Germany.
 (113) *Proceedings*, Am. Wood Preservers' Assoc., Baltimore, Md.
 (114) *Journal*, Institution of Municipal and County Engineers, London, England, 1s. 6d.
 (115) *Journal*, Engrs.' Club of St. Louis, St. Louis, Mo., 35c.

LIST OF ARTICLES

Bridges.

- The Advantage of a Combined Use of Tables and Formulas in the Computation of Bridge Stresses. R. P. U. Marquardsen. (4) Jan.
 Design of a Railway Pontoon Bridge.* H. J. Hansen. (4) Jan.
 The Use of Influence Lines. R. W. Flowers and H. N. Jones, Jr. (4) Feb.
 Deflection of Trusses.* E. H. Casper and C. J. Kennedy. (4) Feb.
 The Construction of Culverts and Short Span Bridges. E. K. Borchard. (36) Mar.
 Widening at Nine Elms Between Wandsworth Road and Loco Junction, L. & S. W. R.* (23) Mar. 17.
 The Lethbridge Viaduct.* (11) Mar. 31.

* Illustrated.

The first part of the report deals with the general situation of the country, and the second part with the specific details of the various districts. The first part is divided into two sections, the first of which deals with the general situation of the country, and the second with the specific details of the various districts. The second part is divided into three sections, the first of which deals with the general situation of the country, and the second with the specific details of the various districts. The third part is divided into four sections, the first of which deals with the general situation of the country, and the second with the specific details of the various districts. The fourth part is divided into five sections, the first of which deals with the general situation of the country, and the second with the specific details of the various districts.

THE SECOND PART OF THE REPORT

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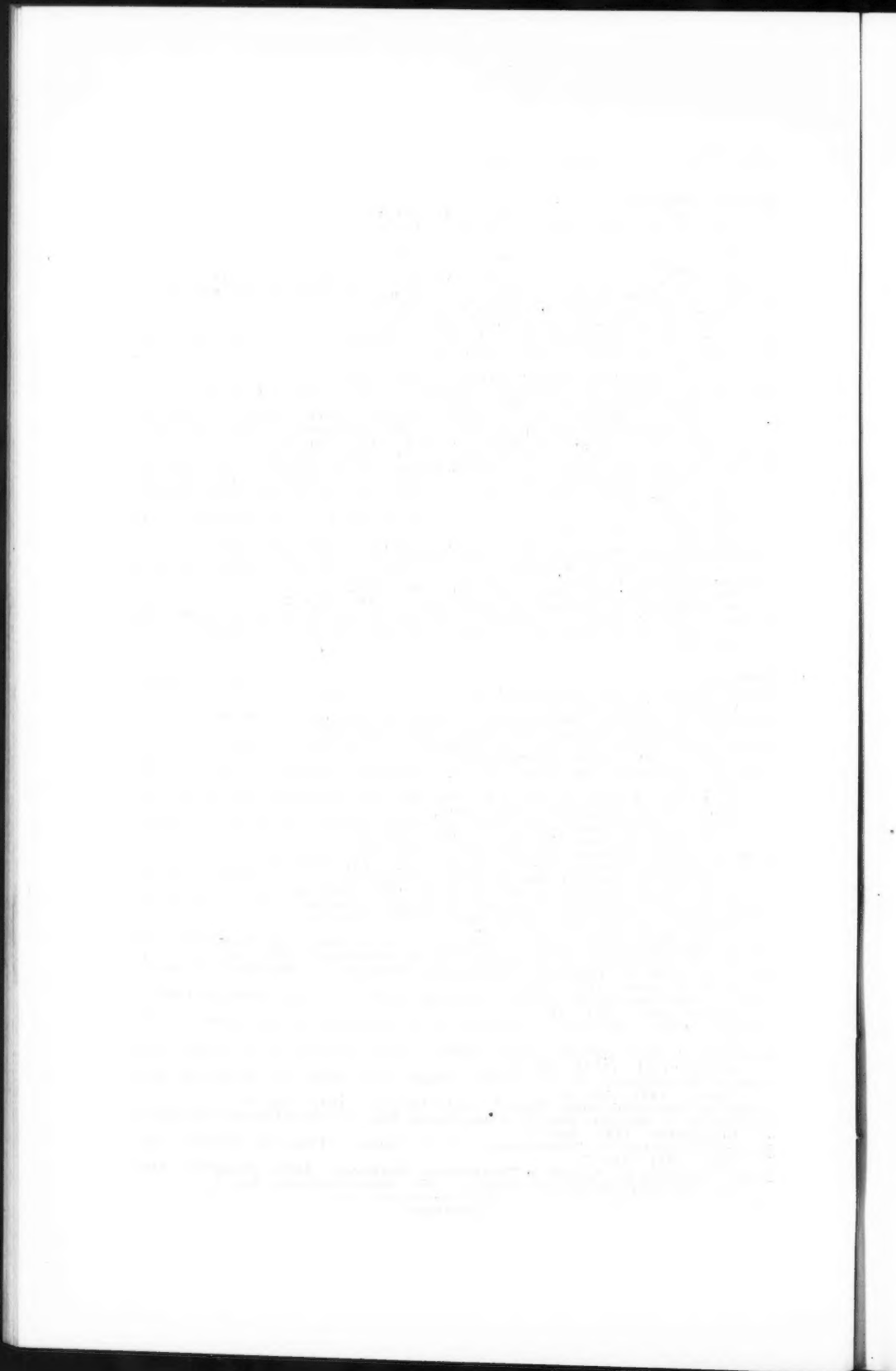
Bridges—(Continued).

- Railroad Bridge of Steel and Concrete.* M. Robert Conover. (87) Apr.
 Box Concrete Retaining Wall on Western Pacific Ry.* J. H. Knowles. (13) Apr. 6.
 Impact Formulas for Highway Bridge Design. E. H. Darling. (96) Serial beginning Apr. 6.
 How the Forest Service Bridges the More Remote Stream Crossings.* (14) Apr. 8.
 Design and Construction of a High Level Reinforced Concrete Highway Bridge Across the Shurnsund in Sweden.* George Brockner. (From *Concrete and Constructional Engineering*.) (86) Apr. 12.
 Reconstruction of Mississippi River Bridge at Keokuk.* (13) Apr. 13.
 High Water Undermines Bridge Abutments at Alpena.* Joseph McNeil. (13) Apr. 13.
 A Half-Mile Double-Deck Concrete Bridge.* (46) Apr. 15.
 Some Design Features of a Reinforced Concrete and Steel Viaduct between Portland and South Portland, Me.* (86) Apr. 19.
 Painting and Maintaining Steel Highway Bridges. George Hogarth. (Abstract of paper read before the Ontario Dept. of Public Highways.) (86) Apr. 19.
 Arch Viaduct of Nickel Steel Spanning 285 Ft.* (13) Apr. 20.
 Bridge Carrying Highway and Irrigation Flume.* (13) Apr. 20.
 Standard Concrete Abutments for Michigan Bridges. C. V. Dewart. (13) Apr. 20.
 Erecting a Truss Bridge with a Locomotive Crane.* C. M. McVay. (15) Apr. 21.
 Foundations for Dayton Bridge Finished in Four Months Despite Four Floods.* (14) Apr. 22.
 Concrete Balustrades Enhance Appearance of Bridges.* L. N. Edwards. (14) Apr. 22.
 Eight Plate-Girder Spans over Gila River Washed Out.* (13) Apr. 27.
 Reversible Falls Steel-Arch Bridge of 565-Ft. Span.* (13) Apr. 27.
 American Railroad Bridges.* J. E. Greiner, M. Am. Soc. C. E. (Abstract of paper read before the Inter. Eng. Congress.) (96) Apr. 27.
 A New Bridge for the Bessemer and Lake Erie.* (15) Apr. 28.
 Viaduc et Pont Tournant sur l'Étang de Caronte, Traversée du Canal de Marseille au Rhône par la Ligne de Miramas à l'Estaque-Marseille.* A. Dumas. (33) Mar. 25.

Electrical.

- London County Council Tramway Accounts. (From Report of the London County Council.) (73) Mar. 17.
 Efficiency of Projectors and Reflectors. Haydn T. Harrison. (Abstract of paper read before the Liverpool Eng. Soc.) (73) Mar. 17.
 Magnets for Electric Ignition.* H. Armagnat. (Translated from *La Revue Electrique*.) (73) Serial beginning Mar. 24.
 Hoisting Controllers for Large Electric Revolving Cantilever Cranes.* (73) Mar. 24.
 The Resistance of Moist Sandstone to High and Low Frequency Alternating Currents. N. W. McLachlan. (73) Mar. 24.
 The Nitrogen Filled Incandescent Lamp for Street Lighting. A. H. Ford. (Paper read before the Iowa Eng. Soc.) (86) Mar. 29.
 German Portable Wireless Telegraph Sets. (11) Mar. 31.
 Ball Bearings for Electric Motors.* T. E. C. H. (26) Mar. 31.
 The Production of Constant High Potential with Moderate Power Output.* A. W. Hull. (From *General Electric Review*.) (26) Mar. 31.
 Recent Progress in Industrial Lighting. L. Gaster. (Abstract of paper read before the Assoc. of Supervising Electricians.) (47) Mar. 31.
 Street Lighting in Detroit. (60) Apr.
 An Investigation into the Magnetic Behavior of Iron at Very High Frequencies with the Aid of a Poulsen-Arc Generator.* N. W. McLachlan. (77) Apr. 1.
 The Application of Telephone Transmission Formulae to Skin-Effect Problems. G. W. O. Howe. (77) Apr. 1.
 Notes on Some Small Points Relating to Duplex Balances on Long Submarine Cables.* Walter Judd. (77) Apr. 1.
 Insulating Oils.* (Reports of Committee of the Institution of Elec. Engrs.) (77) Apr. 1.
 Underground Cable Splicing. James Burns. (From *Bulletin of the Pacific Light & Power Co.*) (111) Apr. 1.
 Outdoor Substations.* H. W. Young. (Paper read before the Wisconsin Elec. Assoc.) (17) Apr. 1.
 Lethbridge Municipal Power Plant.* A. G. Christie. (64) Apr. 4.
 Distribution of Magnetic Flux in Commutating Zone of Direct-Current Machines.* Cl. Shenfer. (73) Apr. 7.
 Mechanical Stresses in Transformers.* J. F. Peters. (From the *Electric Journal*.) (73) Apr. 7.
 Electric Furnaces as Applied to Non-Ferrous Metallurgy. Alfred Stansfield. (Paper read before the Inst. of Metals.) (47) Serial beginning Apr. 7.

* Illustrated.



Electrical—(Continued).

- Iron Wire for Distribution and Transmission Lines.* (27) Apr. 8.
 Standard Oil Boiler Plants at Whiting.* Thomas Wilson. (64) Apr. 11.
 Three-Phase Generators for Rjukan 2 Power-Station at Saaheim, Norway.* (11) Apr. 14.
 Large Accumulator Sub-Station of the Metropolitan Electric Supply Co.* (73) Apr. 14.
 Transformer Design. F. M. Denton. (73) Serial beginning Apr. 14.
 The Construction of High-Tension Cable Joints.* Phillip Torchio. (27) Apr. 15.
 The Interpretation of Electromagnetic Units. M. Ascoli. (Translated by A. E. Kennelly from *L'Elettrotecnica*.) (27) Apr. 15.
 Operating Characteristics of Current Transformers.* Mark L. Harned. (27) Apr. 15.
 Simplifications in Design of Outdoor Stations.* M. M. Samuels. (27) Apr. 15.
 The Application of Electricity to Exhauster Driving. H. C. Widlake. (66) Serial beginning Apr. 18.
 Telegraph Codes of the World. Donald McNicol. (From the *Railroad Man's Magazine*.) (19) Apr. 22.
 Electric Service for Crane Company's New Works.* (27) Apr. 22.
 The Value of Electric Signs to a Town.* B. E. Jack. (27) Apr. 22.
 Danville Municipal Lighting Plant.* Warren O. Rogers. (64) Apr. 25.
 A Coupon Purchase Plan for Lamp Renewals.* S. W. Borden. (27) Apr. 29.
 Operation of a Small Town Generating Station.* (27) Apr. 29.
 Saving Power with Watt-Hour Meters.* F. V. Skelley. (17) Apr. 29.
 Die neue Kennzeichnung der Glühlampen nach Watt in der Praxis.* Rud. Naujoks. (41) Mar. 30.

Marine.

- Naval Preparedness and the Civilian Engineer. Frank J. Sprague. (4) Feb.
 Evolution in Shipbuilding. A. C. Holzapfel. (From the *Shipping World*.) (19) Serial beginning Feb. 26.
 The Screw Propeller.* Archibald Denny. (Paper read before the Inst. of Marine Engrs.) (19) Mar. 4.
 Torpedo Tubes. (From the *Marine Engineer and Naval Architect*.) (19) Mar. 4.
 The Geared Turbine Propelling Machinery of the S. S. *Northumberland*. (11) Serial beginning Mar. 17.
 Power Driven Tools on Board Ship. J. H. Thomson. (Paper read before the Inst. of Marine Engrs.) (47) Mar. 17.
 Calculations for Ship's Forms. D. W. Taylor. (Paper read before the Inter. Eng. Congress.) (19) Mar. 18.
 The Corrosion of Non-Ferrous Alloys: Report of Corrosion Committee of the Inst. of Metals. (Marine Boilers.) (12) Mar. 31.
 Controlling Marine Engines from the Bridge on S. S. *Oura Maru*.* (11) Mar. 31.
 Propeller Shafts; How to Preserve and How to Protect Them.* A. J. Lebeda. (Paper read before the Inst. of Marine Engrs.) (47) Apr. 7.
 Recovering Stranded Ships after Galveston Storm.* Ellis D. Thompson. (13) Apr. 13.
 The Determination of the Principal Dimensions of Marine Reciprocating Propelling Machinery.* T. S. Cockrill. (12) Apr. 14.
 Rapid Fire Revolver Principle Applied to the Submarine Torpedo Tube.* Edwin Cerio. (46) Apr. 15.

Mechanical.

- The Economy of Fuel. W. A. Bone. (Paper read before the Soc. of Chemical Industry.) (66) Mar. 14.
 Fuel Oils from Coal. Harold Moore. (Paper read before the Manchester Assoc. of Engrs.) (66) Mar. 14.
 Commercial Motor Vehicles for Railway and Industrial Purposes.* (23) Mar. 17.
 The Petter Semi-Diesel Engine.* (12) Mar. 17.
 The Buoyancy of Zeppelins. (12) Mar. 17.
 The Aeroplane Catapult in the United States Navy.* (12) Mar. 17.
 Some Observations on Continental Foundry Practice.* H. G. Barrett. (Paper read before the British Foundrymen's Assoc.) (47) Mar. 17.
 India-Rubber and Balata Belting. James Tinto. (Abstract of paper read before the Manchester Assoc. of Engrs.) (47) Mar. 17.
 Some Coal-Cutting Difficulties. H. T. Mackinnon. (Paper read before the Assoc. of Min. Elec. Engrs.) (22) Mar. 17.
 Extensions and Improvements at the Southampton Gas-Works.* F. Durkin. (Paper read before the Southern District Assoc. of Gas Engrs. and Mgrs.) (66) Mar. 21.
 Waste of Coal and Coal Products. Norton H. Humphrys. (66) Mar. 21.
 Construction of Concrete Purifiers at Romford in 1913. W. D. Child. (Paper read before the Southern District Assoc. of Gas Engrs. and Mgrs.) (66) Mar. 21.
 Automatic Machine Development. Ralph E. Flanders. (Abstract of paper read before the Inter. Eng. Congress.) (47) Mar. 24.

* Illustrated.

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Mechanical—(Continued).

- Coal Washery Plant at Normanby Park Steel Works.* (From *Ferro-Concrete*.) (57) Mar. 24.
- Screw Gauges.* (12) Mar. 24.
- Oxy-Acetylene Welding Practice. S. W. Miller. (From *Machinery*.) (19) Mar. 25.
- The Fuel Supply of a Big Power Plant.* J. F. Springer. (19) Mar. 25.
- Refractory Materials and Salty Coals. J. W. Cobb. (Paper read before the Coke Oven Managers' Assoc.) (66) Mar. 28; (57) Mar. 31.
- Coke Fuel for Steam Boilers.* E. W. L. Nicol. (Paper read before the London and Southern Dist. Junior Gas Assoc.) (66) Mar. 28.
- Toluol and the Limestone Process. George Stevenson. (Paper read before the Midland Assoc. of Gas Engrs. and Mgrs.) (66) Mar. 28.
- The Series of Lectures Given to Firemen at Philadelphia Water Pumping Stations on the Theory and Practice of Combustion as Applied to Modern Boiler Room Practice. (86) Mar. 29.
- Steam Plant Efficiency. Vernon Smith. (Abstract of paper read before the South Wales Inst. of Engrs.) (47) Mar. 31.
- Labor Saving Devices in the Machine Shop.* Albert A. Dowd. (9) Apr.
- Portland Cement and Its Manufactures. L. G. Sprague. (67) Apr.
- Labor Saving in the Foundry.* Richard Moldenke. (9) Apr.
- A Modern Sand and Gravel Plant.* (67) Apr.
- Malleable Iron Castings. Enrique Touceda. (108) Apr.
- Features of Rolling Mill Reversing Engines. W. Trinks. (116) Apr.
- Crane Handling for Sheet Mill Products.* Charles C. Lynde. (116) Apr.
- Standardization of Power Plant Operating Costs.* Walter N. Polakov. (55) Apr.
- Flame Length as Factor of Gas Burning.* Frederick Pelter. (Paper read before the Cleveland Eng. Soc.) (116) Apr.
- Operating Characteristics of Gas Producers. Franz Denk. (116) Serial beginning Apr.
- Characteristics of High Speed Tool Steels. (62) Apr.
- Comparison of Team and Tractor for Hauling Gravel. O. L. Kipp. (60) Apr.
- Coal-Gas Residuals and Their Application. Fred H. Wagner. (3) Apr.
- Roll and Pass Layout for Rolling Specials.* W. S. Standiford. (116) Apr.
- Oxy-Acetylene Welding of Steel Tubing. Charles C. Lynde. (62) Apr.
- Oxy-Acetylene Welding on Heavy Sections. C. K. Bryce. (62) Apr.
- Powdered Coal as a Fuel for Boiler Plants. Reginald Trautschold. (62) Apr.
- An Improved Circular-Feed, All-Screen Mortar for Stamp Mills.* E. H. Moyle. (82) Apr. 1.
- Mass Screening with Flat Screens.* Edward S. Wiard. (105) Apr. 1.
- Producer Gas Power from Northwestern Coals. H. V. Carpenter. (Paper read before the Oregon Soc. of Engrs.) (111) Apr. 1.
- Bunsen Burner Design and Operation.* G. C. Cornalian. (Paper read before the Illinois Gas Assoc.) (24) Apr. 3.
- Glassware and the Gas Industry. S. B. Langlands. (Paper read before the Illuminating Eng. Soc.) (66) Apr. 4.
- Efficiency in the Utility Plant.* Charles Brossmann. (Paper read before the Indiana Eng. Soc. and the Indiana San. and Water Supply Assoc.) (64) Apr. 4.
- Sawmill Waste in Suction Producer Plant.* George S. Wilson. (64) Apr. 4.
- The Design and Construction of Continuous Kilns.* A. F. Greaves-Walker. (76) Serial beginning Apr. 4.
- The Captive Fire System for Furnaces.* J. H. Barraclough. (Paper read at Bradford.) (66) Apr. 4.
- Large Water-Works Machine Shop at Los Angeles.* Burt A. Heinly. (13) Apr. 6.
- Types and Cost of Slack Cable Excavator Plants. (96) Apr. 6.
- Moving a Sand Bin.* E. P. Muntz. (96) Apr. 6.
- Modern Coal and Coke Handling Machinery as Used in the Manufacture of Gas. J. E. Lister. (Paper read before the Soc. of Engrs.) (57) Apr. 7; (66) Apr. 4.
- By-Product Coke Ovens.* Kotaro Shimomura. (22) Apr. 7.
- Sherry's Sawmill and Timber Works.* (26) Apr. 7.
- Gasoline from Natural Gas. (11) Apr. 7.
- Coaling Stations for the Economical Handling of 25 to 50 Tons Per Day.* L. Jutton. (23) Apr. 7.
- Lubrication of Station and Industrial Machinery. Arthur Curtis Scott. (27) Serial beginning Apr. 8.
- Methods for Handling Boilers in 100 000 Kw. Station.* (27) Apr. 8.
- The Ohio Commission's Investigation of Natural Gas Shortage in Cleveland. C. V. Critchfield. (24) Apr. 10.
- The Influence of Compression in Internal-Combustion Engines.* R. E. Mathot. (64) Apr. 11.
- Industry's Work in War Time. (President's Address on Gas and Other Industries.) A. Mackay. (Paper read before the Scottish Gas Mgrs.) (66) Apr. 11.
- A New Power Backfilling Scraper with Caterpillar Traction.* (86) Apr. 12.

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Mechanical—(Continued).

- Navy has Largest Experimental Wind Tunnel.* William McEntee. (13) Apr. 13; (19) Apr. 8.
- Charts for Ratios for Speeds in Geometric Progression. A. Lewis Jenkins. (72) Apr. 13.
- The Running of Boiler Plants and National Economy. D. Brownlee. (11) Serial beginning Apr. 14.
- The Effect of the Presence of Moisture in Gas Coke Fuel.* Pakenham Beatty and A. F. Smith. (26) Apr. 14.
- Concrete and Asphalt Mixing Plant Saves Its Cost in One Year.* George H. Binkley. (17) Apr. 15.
- Operation of the Shaker Screen. John A. Garcia. (45) Apr. 15.
- Distillation of Colorado Lignite.* A. J. Hoskin. (45) Apr. 15.
- Burning and Distilling Water-Gas Tar.* Charles Otten. (Paper read before the New England Assoc. of Gas Engrs.) (66) Apr. 18.
- Welding of High-Pressure Mains.* A. S. Hall. (Paper read before the New England Assoc. of Gas Engrs.) (66) Apr. 18.
- The Application of Electricity to Exhauster Driving. H. C. Widlake. (66) Serial beginning Apr. 18.
- Why Refractories Are a World Necessity. George A. Balz. (Paper read before the New Jersey Clayworkers' Assoc.) (76) Apr. 18.
- The Bailey Steam-Flow Meter.* (64) Apr. 18.
- Paving Brickmakers Seek Light on Cost.* (76) Apr. 18.
- Common Abuses That Shorten the Life of Motor Truck Tires.* A. H. Leavitt. (86) Apr. 19.
- Welding Aluminum Automobile Bodies.* C. R. Sutton. (20) Apr. 20; (101) Apr. 28.
- Handling Retail Coal in a Concrete Cylinder Plant.* Charles H. Higgins. (13) Apr. 20.
- Specifications for Purchase of Leather Belting. (72) Apr. 20.
- Steam Shovels and Locomotive Cranes.* L. K. Silcox. (15) Apr. 21.
- The Development of the Automobile Differential.* Victor W. Page. (19) Apr. 22.
- Civilian Motor Trucks as Army Supply Trains.* Joseph Brinker. (46) Apr. 22.
- Is a Gas Company Justified in Charging a Higher Rate for Gas Served Through a Prepayment Meter. A. R. Manley. (Paper read before the Wisconsin Gas Assoc.) (24) Apr. 24.
- Characteristics of Pyrometers. O. L. Kowalke. (Paper read before the Wisconsin Gas Assoc.) (24) Apr. 24.
- Operating Inclined Chamber Retorts.* W. J. O'Rourke. (Paper read before the Southern Gas Assoc.) (24) Apr. 24; (83) Apr. 15.
- Industrial Fuel Business. S. Tully Willson. (Paper read before the Southern Gas Assoc.) (24) Apr. 24.
- Action of Furnace Gases. S. H. Viall. (64) Apr. 25.
- Indicating the Ammonia Compressor.* Robert H. Karl. (64) Serial beginning Apr. 25.
- Theory of Economic Milling.* Reginald Trauttschold. (72) Apr. 27.
- Forge Shop at Naval Station, Pearl Harbor, Hawaii.* J. A. Furer. (72) Apr. 27.
- New Electrically Driven Tube Mill.* (20) Apr. 27.
- Light Steam Shovel with Scraper Action. (13) Apr. 27.
- Roller Steel and Corrosion.* Geo. L. Fowler. (15) Apr. 28.
- Installation of Tube Mills.* Charles Labbe. (16) Apr. 29.
- Farm Tractors. Philip S. Rose. (Paper read before the Soc. of Automobile Engrs.) (19) Apr. 29.
- Lutes and Cements. S. S. Sadtler. (Paper read before the Am. Inst. of Chemical Engrs.) (19) Apr. 29.
- Analysis of Fuel Gas.* R. L. Hallett. (16) Apr. 29.
- Les Progrès Successifs dans la Carbonisation de la Houille au Point de Vue de la Récolte des Sous-Produits.* Paul Mallet. (92) Jan.
- Zur Bestimmung der Gasdichte.* (50) Dec. 9, 1915.
- Der bartsche Drehrostgaserzeuger.* W. G. Poetzsch. (50) Dec. 9, 1915.
- Beiträge zur Physik des Fluges: I, Prinzip des ökonomischsten Fluges. Nimführ. (115) Jan. 27.

Metallurgical.

- The Economical Extraction of Tin and Tungsten from Cornish Ores. (12) Mar. 31.
- Blast Furnace Working and the Function of Slags.* J. E. Fletcher. (Abstract of paper read before the Staffordshire Iron and Steel Inst.) (22) Mar. 31.
- Electric Separation of Furnace Ore Dust.* A. F. Nesbit. (116) Apr.
- Factors in the Operation of the Cyanide Process. G. H. Clevenger. (Paper read before the Pan-American Congress.) (82) Apr. 1.
- The Operation of the Blast Furnace.* J. E. Johnson, Jr. (105) Serial beginning Apr. 1.
- The Available Hearth Heat of the Blast Furnace. Alex. L. Feild. (105) Apr. 1.
- Some Sources of Error in Iodometric Determination of Copper. Carl E. Smith. (105) Apr. 1.

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

Metallurgical—(Continued).

- The Metallurgical Disposal of Flotation Concentrates. R. J. Anderson. (105) Apr. 1.
 Electrical Furnaces as Applied to Non-Ferrous Metallurgy. Alfred Stansfield. (Paper read before the Inst. of Metals.) (22) Apr. 7.
 Some Tin-Aluminum-Copper Alloys.* A. A. Read and R. H. Greaves. (Paper read before the Inst. of Metals.) (11) Apr. 7.
 The Analysis of Aluminum and Its Alloys. W. H. Withey. (Paper read before the Inst. of Metals.) (47) Apr. 7.
 Smelting Copper Pyrites with Copper Ore 40% and 7.5% Sulphur. Robert C. Sticht. (Paper read before the Australian Inst. of Min. Engrs.) (82) Apr. 8.
 The Selby Lead Smelter.* T. A. Rickard. (103) Apr. 8.
 Precipitating Action of Carbonaceous Shale in Cyanide Solution.* Paul W. Avery. (103) Apr. 8.
 Machinery for Cyaniding Flotation Concentrate.* A. E. Drucker. (103) Apr. 8.
 Effect of Borax in Matte Fusion.* G. E. Johnson. (16) Apr. 8.
 Flotation Tests on Joplin Lead and Zinc Ores. Clarence A. Wright. (Report to the Bureau of Mines.) (82) Apr. 15.
 The Electrolytic Determination of Copper in Copper-Manganese. Emil D. Koepping. (105) Apr. 15.
 Feasibility of Western Electro-Metallurgy. Dorsey A. Lyon and Robert W. Keeney. (111) Serial beginning Apr. 15.
 Monel Metal.* F. H. Mason. (103) Apr. 22.
 Oils for Flotation. Chas. T. Clayton and C. E. Peterson. (103) Apr. 22.
 Concentration of Zinc Ore in Wisconsin.* H. P. Wherry. (103) Apr. 22.
 The Milling of Tungsten Ores.* James F. Magee. (16) Apr. 22.
 The Control of Ore Slimes. Oliver C. Ralston. (16) Serial beginning Apr. 29.
 Braden Roasting and Sulphuric Acid Plants.* J. B. Wise. (82) Apr. 29.
 L'Epuración du Gaz de Haut Fourneau à l'Acierie de l'Illinois Steel Co. à Chicago.* (33) Mar. 25.
 L'Acier Martin dans le Monde, sa Production Comparée à Celle des Autres Aciers.* Emile Demenge. (33) Serial beginning Apr. 1.

Military.

- Aerial Torpedoes.* (From *La Nature*.) (19) Feb. 26.
 The Development of Military Small Arms.* Orin B. Mitcham. (19) Mar. 11.
 A Shell Machinery Equipment, Boring and Turning Lathe for 4.5-Inch Shell.* (12) Mar. 24.
 The 12-In. Howitzer, in National Defense.* C. A. Tupper. (20) Apr. 6.
 Engineering Methods of Army Post Planning and Design.* R. C. Hardman. (13) Apr. 13.
 Large Naval and Coast-Defense Guns.* G. H. Holden. (19) Apr. 15.
 Military Engineering.* Richard Park. (Abstract of paper read before the Engrs. Club of San Francisco.) (111) Serial beginning Apr. 15.

Mining.

- High-Speed Air-Compressors for Mining Work.* J. M. Walshe. (Paper read before the North Staffordshire Inst. of Min. and Mech. Engrs.) (106) Vol. 51, Pt. 1.
 The Logic of Trams.* John Gibson. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (106) Vol. 51, Pt. 1.
 The Connexion Between the North-Western European Coalfields.* X. Stalnier. (Paper read before the Manchester Geol. and Min. Soc.) (106) Vol. 51, Pt. 1.
 The Hirsch Portable Electric Lamp.* Hiram H. Hirsch. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (106) Vol. 51, Pt. 1.
 A Method for the Rapid Estimation of Oxygen and Blackdamp in the Air of Safety-Lamp Mines. Henry Briggs. (Paper read before the Min. Inst. of Scotland.) (106) Vol. 51, Pt. 1.
 Explosives. Frank Bailey. (Paper read before the Assoc. of Engrs.-in-Charge.) (19) Feb. 26.
 Types of Modern Electric Winding.* Frank Anslow. (Paper read before the Assoc. of Min. Elec. Engrs.) (22) Mar. 31.
 The Use of Wire-Rope Guides for Pit Cages.* Wm. Ross. (Paper read before the National Assoc. of Colliery Mgrs.) (22) Mar. 17.
 Platinum at the Boss, Mine, Goodsprings, Nevada.* Frank A. Crampton. (103) Apr. 1.
 The Mineral Industry of Chile.* Lester W. Strauss. (103) Apr. 1.
 Oatman and the Tom Reed-Gold Road Mining Districts, Arizona.* Etienne A. Ritter. (82) Apr. 1.
 Accidents from Poisonous Asphyxiating Gases in Mines. L. G. Irvine. (From *Medical Journal of South Africa*.) (57) Apr. 7.
 Deep Mining with Ironclad Coal-Cutters. R. A. Lowry. (From *Mine and Quarry*.) (57) Apr. 7.
 Jigging Anthracite Coal.* E. E. Finn. (45) Apr. 8.
 Metallic Magnesium Industry. William Grosvenor. (Paper read before the Am. Electrochemical Soc.) (16) Apr. 8.

* Illustrated.

Mining—(Continued).

- Accidents Classified by Mining Methods. Albert H. Fay. (Abstract from *Technical Paper 129*, Bureau of Mines.) (16) Apr. 8.
- The Gilman Cut and Fill System of Mining.* Robert H. Dickson. (16) Apr. 8.
- Line and Substation Construction to Serve Mines.* Richard Percy Hines. (27) Apr. 8.
- A Pioneer Bucket Dredge in Northern Nigeria.* H. E. Nicholls. (82) Apr. 8.
- A New Type of Mine Breathing Apparatus.* (57) Apr. 14; (45) Apr. 22.
- Concreting the Barron Shaft, Pachuca, Mexico.* J. E. Smith. (16) Apr. 15.
- A Mine Cost System. Albert E. Hall and George C. McFeely. (16) Apr. 15.
- Dredging in Mozambique.* L. C. de la Marliere. (16) Apr. 15.
- A Record Replacement.* R. G. Miller. (45) Apr. 15.
- Locust Mountain Colliery.* C. M. Young. (45) Apr. 22.
- The Law of Mines. Franklin Wheaton Smith. (103) Apr. 22.
- Tapping a Lake for Hydro-Electric Power in Alaska. R. E. Murphy. (82) Apr. 22.
- Mining Industry of Brazil.* Benjamin Leroy Miller and Joseph T. Singewald, Jr. (16) Apr. 29.
- Arc and Incandescent Headlights.* P. S. Bailey. (45) Apr. 29.
- Working a Steep Coal Seam by the Longwall Method. S. H. Ash. (45) Apr. 29.
- Mica, Its History, Production and Utilization. Hans Zeitler. (19) Apr. 29.
- Rock Drilling with Deep Hole Wagon Rigs Show Speed at Low Cost.* Charles A. Hirschberg. (14) Apr. 29.
- Können mit Rücksicht auf die neuesten sprengtechnischen Erfahrungen Distanz erleichterungen bei Anlage unterirdischer Sprengmittelmagazine gewährt werden? Rudolf Feuchtinger. (115) Feb. 10.

Miscellaneous.

- A Proposed Code of Ethics for the Western Society of Engineers. (4) Jan.
- Regulation of Public Utilities. Leonard A. Busby. (4) Jan.
- Temperature Inversions in Relation to Frost.* Alexander McAdie. (From *Annals of the Astronomical Observatory of Harvard Coll.*) (19) Feb. 26.
- Our Modern Engineering Education. Edward Orton, Jr. (Paper read before the Ohio State Univ.) (19) Mar. 4.
- Business in Engineering. F. G. Hatch. (Paper read before the Junior Institution of Engrs.) (47) Serial beginning Mar. 17.
- Extraction of Benzol and Toluol by American Gas Oil and Green Oil. John Bond and Hubert Pooley. (Paper read before the Midland Assoc. of Gas Engrs. and Mgrs.) (66) Mar. 28.
- Engineering Co-operation. C. E. Drayer. (86) Mar. 29.
- Effect of Barometric Pressure on Temperature Rise of Self-Cooled Stationary Induction Apparatus.* V. M. Montsinger. (42) Apr.
- Engineers in Politics. C. E. Drayer. (55) Apr.
- Service for the Society. Edmund M. Blake. (109) Apr.
- The Future of the Engineering Profession. A. J. Himes. (55) Apr.
- Standardization of Safety Principles. Carl M. Hansen. (55) Apr.
- The Attitude of the Employer Towards Accident Prevention and Workmen's Compensation. W. H. Cameron. (55) Apr.
- Modern Movement for Safety from Standpoint of Manufacturer. Melville W. Mix. (55) Apr.
- How to Increase Factory Efficiency.* O. M. Becker. (9) Apr.
- The Technical Production of Hydrogen and Its Industrial Application. Harry L. Barnitz. (105) Apr. 1.
- Potash from Kelp in Southern California. H. L. Glaze. (105) Apr. 1.
- Depreciation as an Element in Rate Making. Jared How. (From Arguments before the California Railroad Comm.) (24) Apr. 3.
- Office Methods for Small Contracting Business. C. M. Cobb. (86) Apr. 5.
- Methods and Appliances for the Attainment of High Temperatures in the Laboratory. (Discussion before the Faraday Soc.) (47) Apr. 14.
- Production of Nitric Acid from Ammonia by the Ostwald Process.* (105) Apr. 15.
- Properties of Cyanogen and Its Recovery from Coal Gas.* Fred H. Wagner. (83) Apr. 15.
- Coal Tar; Its Development and Uses. Arno C. Wilke. (Paper read before the Wisconsin Gas Assoc.) (24) Apr. 17.
- Methods for Dealing with Arsenical Sulphuric Acid in the Manufacture of Sulphate of Ammonia.* P. Parrish. (66) Apr. 18.
- Filing Correspondence in a Municipal Department. Robert J. Fee. (13) Apr. 27.
- L'Enseignement doit Avoir pour But Exclusif la Formation de l'Esprit.* Henry Le Chatelier. (92) Jan.

Municipal.

- Road and Concrete Materials. H. S. Mattimore. (36) Mar.
- Economics of Highway Engineering. L. I. Hewes. (36) Mar.
- What the Highway Engineer Should Know About Bituminous Materials. Prevost Hubbard. (36) Mar.

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The second part is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

The third part of the paper is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom. The fourth part is devoted to a detailed discussion of the problem. It is shown that the problem is of great importance in the theory of the structure of the atom.

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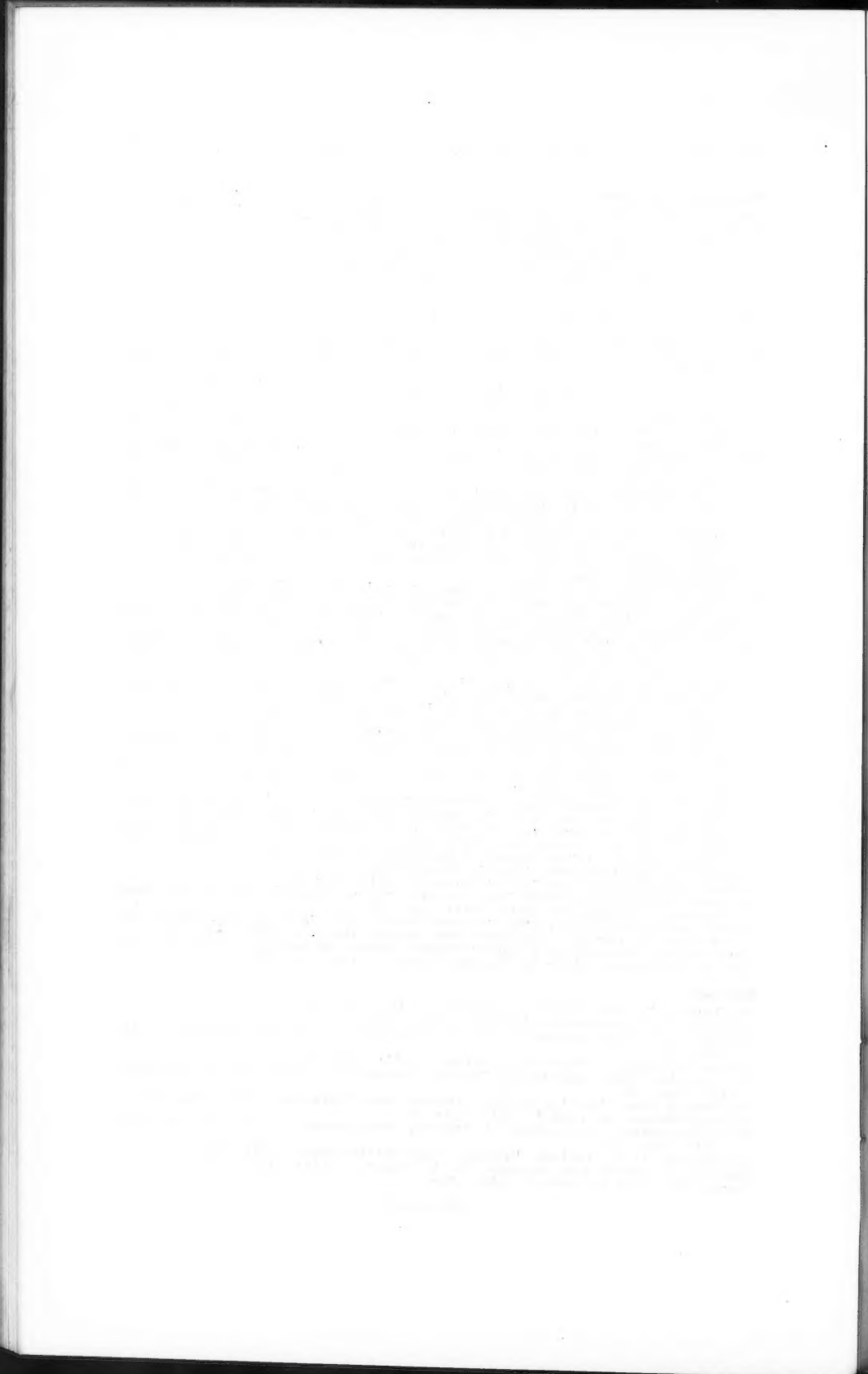
Municipal—(Continued).

- Drainage and Preparation of Subgrades. J. H. Huber. (36) Mar.
 Width and Allocation of Space in Roads. F. Longstreth Thompson. (Paper read before the Town Planning Inst.) (104) Mar. 17.
 Relation Between the Properties of Hardness and Toughness of Road-Building Rock. Prevost Hubbard and F. H. Jackson. (104) Mar. 17.
 Concrete Road Construction in Oakland County, Michigan.* M. De Glopper. (60) Apr.
 Municipal Improvements for 1916. (60) Apr.
 Concrete Road Construction in Aurora.* B. H. Plepmeier. (67) Apr.
 Building Brick Roads Minus the Sand Cushion.* (76) Apr. 4.
 Costs of Concrete Roads in the United States in 1914. (86) Apr. 5.
 An Unusual Application of the Rattler Test for Paving Bricks.* F. L. Roman. (86) Apr. 5.
 Comparative Costs of Hauling Gravel by Team and by Tractor for Road Work. O. L. Kipp. (Paper read before the Minnesota Engrs. and Surveyors' Soc.) (86) Apr. 5.
 The Road Situation and State Highway Department Plans in Illinois. Wm. W. Marr. (86) Apr. 5.
 Putting Macadam Roads in the Permanent Class.* Daniel T. Pierce. (Abstract of paper read before the National Conference on Concrete Road Building.) (86) Apr. 5.
 Curbs and Sidewalks; Some Practical and Aesthetic Considerations in Their Design and Location. M. E. Chamberlain. (Abstract of paper read before the Minnesota Surveyors' and Engrs.' Soc.) (86) Apr. 5.
 An Analysis of the Advantages of Monolithic Brick Pavement.* Maurice B. Greenough. (Abstract of paper read before the Ohio Eng. Soc.) (86) Apr. 5.
 Bituminous Roads. Robert C. Muir. (Paper read before the Conference on Road Construction.) (96) Apr. 6.
 A Study of Cracks in a Concrete Roadway at Indiana University.* Ulysses S. Hanna. (Paper read before the Indiana Eng. Soc.) (86) Apr. 12.
 Patrol System, Gang System and Combination Patrol and Gang System of Road Maintenance in Maryland. H. G. Shirley. (86) Apr. 12.
 Methods of Fixing Curb and Sidewalk Grades at Street Intersections on Steep Gradients.* John Wilson. (Abstract of paper read before the Minnesota Eng. Soc.) (86) Apr. 12.
 Bituminous Paving Plants. L. Kirschbaum. (96) Apr. 13.
 Building and Maintaining Roads with Refined Tar. John S. Crandell. (Abstract of paper read before the Inter. Road Congress.) (96) Apr. 13.
 Wood-Block Pavement is Improved by Traffic.* (13) Apr. 13.
 City Planning by the Zoning System in the Bronx.* (13) Apr. 13.
 Oiling on Earth Roads. B. H. Plepmeier. (*Bulletin 11*, Illinois State Highway Dept.) (19) Apr. 15.
 36-Mile Concrete Road Built by Day Labor will Link Canadian Cities.* H. S. Van Scoyoc. (14) Apr. 15.
 Experience with Bitumen Carpeted Concrete Pavement in Ann Arbor, Mich. Manly Osgood. (Paper read before the Michigan Eng. Soc.) (86) Apr. 19.
 Federal Plan Commission's Report; Government Receives Recommendations Looking Toward the Creation of a Truly Imposing Capitol (Ottawa, Canada).* Sir Thomas White. (From Report to Parliament.) (96) Apr. 20.
 Details of a Model Concrete Road in Pennsylvania.* (13) Apr. 20.
 Various Aggregates in Test Concrete Roads.* (14) Apr. 22.
 Rational Method of Selecting Types Evolved for a Comprehensive County Road System.* William W. Marr. (14) Apr. 22.
 Method and Cost of Constructing Concrete Service Test Road at Philadelphia, Pa. William H. Connell. (Abstract from Annual Report.) (86) Apr. 26.
 Bronx Borough Makes its Own Asphalt Repairs, Effects Big Saving.* (14) Apr. 29.
 New Device Measures Wear on Concrete Roads.* (14) Apr. 29.

Railroads.

- The Longest Railway Tunnel in America.* (19) Mar. 4.
 American Built Locomotives Abroad.* (19) Mar. 11.
 Baldwin 4-4-0 Type Locomotive for the Philadelphia & Reading Railway.* (23) Mar. 17.
 Russian Standards of Track Construction.* (23) Mar. 24.
 The Director Class Superheated Express Locomotives, Great Central Railway.* (23) Mar. 24.
 Superheated 2-6-0 Type Locomotive, Japanese State Railways.* (23) Mar. 31.
 Standard Wagons for India.* (23) Mar. 31.
 Electro-Mechanical Interlocking at Trenton, Pennsylvania R. R.* W. M. Post. (23) Mar. 31.
 High-Voltage D. C. Railway Practice. Clarence Renshaw. (42) Apr.
 Diameter of Driving Axle Journals. L. R. Pomeroy. (25) Apr.
 Hopper Coal Cars for India.* (25) Apr.

* Illustrated.



Railroads—(Continued).

- Lubricators for Locomotive Air Pumps.* (25) Apr.
 Steel Box Cars on the Pennsylvania.* (25) Apr.
 Synopsis of the Report of the Chicago Association of Commerce Committee on Smoke Abatement and Electrification of Railway Terminals. George Gibbs. (65) Apr.
 Essentials of Shop Efficiency. G. W. Armstrong. (25) Apr.
 Light-Weight Interurban Cars.* R. W. Palmer. (17) Apr. 1.
 Motors and Phase Converters on the N. & W. Locomotives.* J. V. Dobson. (17) Apr. 1.
 Electric Operation on the C., M. & St. P.* (17) Apr. 1; (15) Apr. 28.
 Suburban Coaches for the Grand Trunk Ry.* James Coleman. (18) Apr. 1.
 Improvement in Passenger Car Construction and Design.* K. F. Nystrom. (Paper read before the Canadian Ry. Club.) (18) Apr. 1; (25) Apr.
 The Necessity for Improved Systems at Railway Terminals. A. Jackson Marshall. (18) Apr. 1.
 Trend of Tractive Power and Results on Fuel Costs, Ten Years' Record, 1904-1914, on Roads Whose Average Tractive Power per Locomotive in 1914 was Fifteen Tons or More. (18) Apr. 1.
 Continuous-Current Railway Motors.* Ernest V. Pannell. (77) Apr. 1.
 The Moore System of Heating, Ventilating and Refrigerating Perishable Commodity Cars.* (18) Apr. 1; (25) Apr.
 Reconstruction of Denver Union Station.* (15) Apr. 7.
 Norfolk & Western Mountain Type Locomotives.* (15) Apr. 7.
 Test of the Young Valve and Valve Gear.* (15) Apr. 7.
 Full Investigation of Amherst Accident. (15) Apr. 7.
 American Built Locomotives for the Greek Government.* (23) Apr. 7.
 Railway Development in Japan. (23) Serial beginning Apr. 7.
 Car Loading on the International & Great Northern Ry. (18) Apr. 8.
 Operation of the P. R. R., Philadelphia-Paoli Electrification.* F. G. Grimshaw. (17) Apr. 8.
 Use of Ampere-Hour Meter and Results Obtained by Chicago & Joliet Electric Railway. J. B. Tinnon. (Paper read before the Illinois Elec. Ry. Assoc.) (17) Apr. 8.
 Electric Switching Locomotives for the C., M. & St. P. Ry.* L. C. Josephs. (18) Apr. 8.
 Commission's Report on the Wreck at Milford, Conn. (18) Apr. 8.
 Investigation of Initial Strains in Steel Rails.* (Report of the Interstate Commerce Comm.) (18) Apr. 8.
 Unique Way of Handling Railroad Scrap.* F. L. Prentiss. (20) Apr. 13.
 Concreting Soft Spots in Railway Roadbed. (13) Apr. 13.
 Empty and Load Freight Brake Equipment.* Walter V. Turner. (Abstract of paper read before the St. Louis Ry. Club.) (15) Apr. 14.
 A New Cut-Off on the Norfolk & Western.* (15) Apr. 14.
 A Less-Than Carload Clearing House.* Henry A. Goetz. (15) Apr. 14.
 New Lehigh Valley Roundhouse at Sayre, Pa.* (15) Apr. 14.
 Europe Struggling with a Ship and Car Shortage.* (23) Apr. 14.
 Location of Passing Sidings on Single Track.* F. L. Dodgson. (Paper read before the Railway Signal Assoc.) (23) Apr. 14.
 Eliminating a Group of Nine Grade Crossings on the Long Island R. R. William L. Selmer. (18) Apr. 15.
 Power Saving in Car Operation. E. S. Gillette. (Paper read before the Illinois Elec. Ry. Assoc.) (17) Apr. 15.
 New All-Steel Cars for the Wilkesbarre & Hazleton Railway.* (17) Apr. 29.
 New Tie-Treating Plant on the Northwestern Railway.* L. J. Putnam. (13) Apr. 20.
 Recent Developments in Roadbed Drainage on Pennsylvania.* W. F. Rench. (15) Apr. 21.
 Scientific Landscape Gardening on Railroads.* I. T. Worthley. (15) Apr. 21.
 Recent Examples of 2-10-2 Type Locomotives.* (15) Apr. 21.
 Covering a Rock Cut with Gunite, New York Central.* N. W. McCallum. (15) Apr. 21.
 Raising the Grade on a High Embankment, Methods of Handling Traffic and Overcoming Slides in Enlarging the Approach Fill for the Bridge at Sibley, Mo.* (15) Apr. 21.
 Long and Short Wheel Base Test Cars.* C. A. Briggs. (Paper read before the National Assoc. of Scale Experts.) (15) Apr. 21.
 A Small Railroad Station that Pleases the Eye; Mountain Station, South Orange, the Delaware, Lackawanna & Western Railroad.* (14) Apr. 22.
 A Study of a Corrugated Rail.* Henry M. Sayers. (17) Apr. 22.
 Experiments in Magnetic Determination of Inhomogeneities in Steel Rails.* Charles W. Burrows. (Scientific Paper No. 272, Bureau of Standards.) (18) Apr. 22.
 Designing a Scale to Order.* Eugene Motchman. (18) Serial beginning Apr. 22.
 The Preparation of Stoker Coal.* (15) Apr. 28.
 The Bradford Collision. (15) Apr. 28.

* Illustrated.

Railroads—(Continued).

- Extensive Grade Separation at Spokane, Wash.* (15) Apr. 28.
 Studies in Operation, the Erie Railroad.* (15) Apr. 28.
 Accelerated Drying of Paint on Passenger Coaches, Pennsylvania Railroad.* (18) Apr. 29.
 The Simplex System of Compounding for Mallet Locomotives.* (18) Apr. 29.
 Electrification of Freight Yards in New York. (17) Apr. 29.
 Die Fortschritte im elektrischen Vollbahnwesen.* G. Soberski. (102) Serial beginning Jan. 1.
 Gelenkdrehelscheibe.* C. Klensch. (102) Jan. 1.
 Die elektrische Zugförderung auf den Vollbahnen. E. Seefehlner. (115) Jan. 13.
 Verbesserte Schwingensteuerung von Lindner.* E. R. Klien. (102) Jan. 15.
 Gusselserne Schienenplatten.* Bräuning. (102) Feb. 1.
 Gelenkwagen.* Guillery. (102) Feb. 1.
 Das Eisenbahnwesen auf der Baltischen Ausstellung in Malmö 1914.* (102) Serial beginning Feb. 15.
 Anforderungen der schweizerischen Bundesbahnen an Oberbauteile. (102) Feb. 15.
 Zweckmässigkeit und Wirtschaftlichkeit des Eisenbeton bei den Bauten der Eisenbahnen. (102) Serial beginning Feb. 15.

Railroads, Street.

- The Cleveland Street Railway Situation. F. W. Doolittle. (115) Mar.
 Notes on the Maintenance of Rolling Stock on the London Underground Railways.* (26) Mar. 24.
 Emergency Snow-Fighting Equipment.* W. G. Murrin. (17) Apr. 1.
 Boston Elevated Reports on Safety.* (17) Apr. 1.
 Concrete Street Railway Track Foundation Constructed by Penetration, Baltimore, Md.* R. Keith Compton. (Abstract of paper read before the Am. Road Builders' Assoc.) (86) Apr. 5.
 Steep Grade on San Francisco Street Railway Overcome.* (13) Apr. 6.
 Economy of Power Consumption in Car Operation.* G. T. Seely. (Paper read before the Illinois Elec. Ry. Assoc.) (17) Apr. 8.
 Car-Operating Efficiency.* J. F. Layng. (Paper read before the Illinois Elec. Ry. Assoc.) (17) Apr. 8.
 The Brooklyn Articulated Car.* (17) Apr. 8.
 An Inexpensive Steel Pole Line.* W. K. Palmer. (17) Apr. 8.
 Co-operative Education in Electric Railway Work.* A. M. Wilson. (17) Apr. 15.
 Contact Signals for Jamestown, N. Y., Lines.* (17) Apr. 15.
 Safety a Real Economy in Columbus.* (17) Apr. 22.
 Low-Level Car for Rochester.* (17) Apr. 22.
 Factors Affecting Durations of Stop.* D. D. Ewing. (17) Apr. 22.
 Portable Testing Apparatus Arranged for One-Man Operation.* E. D. Ransom. (17) Apr. 29.
 Progress in Car Equipment Lubrication.* Alfred Green. (Abstract of paper read before the Am. Elec. Ry. Assoc.) (17) Apr. 29.
 Nachrückssignale auf der Berliner Hoch-und Untergrundbau.* Bothe. (14) Mar. 30.

Sanitation.

- Ventilation Requirements and Test Methods. E. V. Hill. (4) Feb.
 The Calorimeter as the Interpreter of the Life Processes: a Study of the Fuel Requirements of the Human Individual. Graham Lusk. (Paper read before the National Academy of Sciences.) (19) Mar. 11.
 Modern Concrete Sewers and Other Structures.* (19) Mar. 11.
 Essence of Laws Governing Stream Pollution in the United States. Le Roy K. Sherman. (From *Bulletin No. 16*, Rivers and Lakes Comm. of Illinois.) (86) Mar. 29.
 Municipal Sewer Construction in Moose Jaw, Saskatchewan. (60) Apr.
 The Latest Method of Sewage Treatment. Edward Bartow. (109) Apr.
 Burning Salt-Glazed Sewer Pipe. George D. Morris. (Paper read before the Am. Ceramic Soc.) (76) Apr. 4.
 Trial Activated-Sludge Unit at Cleveland, Ohio.* R. Winthrop Pratt. (13) Apr. 6.
 Hints on the Construction of Vitrified Clay Segment Block Sewers. J. M. Egan, Jr. (Paper read before the Illinois Soc. of Engrs. and Surveyors.) (96) Apr. 6.
 Warm-Air Furnace Supersedes Fireplace Heater.* Tinquill. (101) Apr. 7.
 Plumbing Work in Pittsburgh Comfort Station.* (101) Apr. 7.
 Give Conclusions on Activated Sludge Tests. (14) Apr. 8.
 Disposal of Gas House Wastes.* Paul Hansen. (Paper read before the Illinois Gas Assoc.) (24) Apr. 10.
 The Circulating Tank Water Heater.* E. S. Stack. (Paper read before the Newton and Watertown Gas Light Co.) (24) Apr. 10.
 The Cause, Amount and Restriction of Infiltration of Ground Water Into Sewers. Charles P. Chase. (Paper read before the Iowa Eng. Soc.) (86) Apr. 12.

* Illustrated.

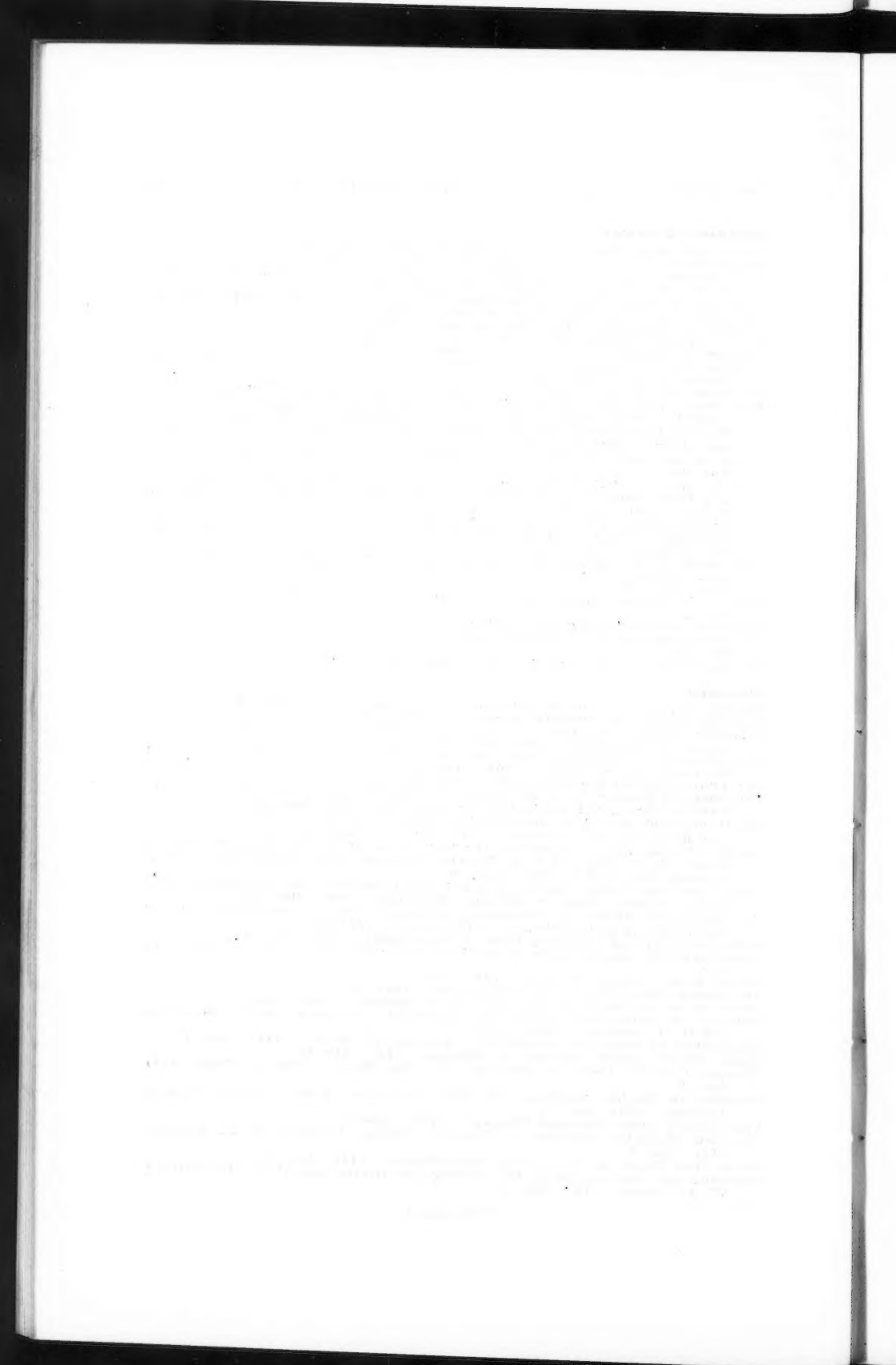
Sanitation—(Continued).

- Water and Sewer Improvements at Madison, Wis.* (13) Apr. 13.
 Sewage-Works Construction at Dallas, Tex. (13) Apr. 13.
 Unit Concrete Construction for Manholes, Vaults and Catch Basins at St. John, N. B.* R. Fraser Armstrong. (96) Apr. 13.
 A Notable System of Piping for Hot-Water Heating, Connecticut. (101) Apr. 14.
 An Indirect and Direct Hot-Water System.* (101) Apr. 14.
 Heating and Ventilating a School by Electricity.* (101) Apr. 14.
 Cost of Operating Steam Heating Systems. (101) Apr. 14.
 Heating of Dynamite Thaw Houses.* (101) Apr. 14.
 Injuries Due to Radium. Thomas Ordway. (From *Journal of the American Medical Assoc.*) (19) Apr. 15.
 Hot-Water and Steam Heating. Ira N. Evans. (64) Serial beginning Apr. 18.
 Four Years' Experience in Mosquito Extermination at Philadelphia. William H. Connell. (From Report to the City of Philadelphia.) (86) Apr. 19.
 The Treatment of Colliery and Other Trade Wastes in the Emscher District. Kenneth Allen. (86) Apr. 19.
 5-Ton Garbage Reduction Plant Yields Profit to City. George R. Bascom. (14) Apr. 22.
 Tests of Effect of Method of Bedding Upon the Supporting Strength of Drain Tile and Sewer Pipes.* N. J. Schlick. (Paper read before the Iowa Drainage Assoc.) (86) Apr. 26.
 Winter Experience with the Activated Sludge Process of Sewage Treatment at Milwaukee—Sludge Disposal. William R. Copeland. (Paper read before the Am. Chemical Soc.) (86) Apr. 26.
 Experiences in the Application of the Activated Sludge Process to Chicago Stock-yards Sewage. Arthur Lederer. (Paper read before the Am. Chemical Soc.) (86) Apr. 26.
 Status of Activated-Sludge Sewage Treatment.* George T. Hammond. (13) Apr. 27.
 Milwaukee Activated Sludge Investigations.* R. O. Wynne-Roberts. (96) Apr. 27.
 Die Versuchsanlage für Abwasserreinigung in Strasburg i. E.* Eisenlohr. (39) Feb. 20.
 Ein Handsatz für Kriegsbeschädigte.* (50) Mar. 30.

Structural.

- The Use of Hydrated Lime in Concrete. H. E. Weidemann. (115) Mar.
 Handling Concrete in Building Operations. (19) Mar. 11.
 Protection Against Lightning.* O. S. Peters. (From *Technologic Paper No. 56*, Bureau of Standards.) (19) Mar. 18.
 Some Examples of Dangerous Structures. W. G. Perkins. (Abstract of paper read before the Concrete Inst.) (104) Mar. 24.
 The Vibrocel System of Construction. (23) Mar. 24.
 The Decay of Metals.* Cecil H. Desch. (Abstract of paper read before the Institution of Engrs. and Shipbuilders in Scotland.) (47) Mar. 24.
 The Cumberland Electrolytic Method of Preventing Corrosion.* J. F. Peter. (Paper read before the Inst. of Metals.) (11) Mar. 31; (22) Mar. 31.
 Results of Some Tests to Determine the Distribution of Vertical Pressure Through Sand.* R. B. Fehr and C. R. Thomas. (Abstract from *Bulletin No. 8*, Pennsylvania State Coll.) (86) Mar. 29.
 Design and Construction Features of a Reinforced Concrete Hotel Building at Lake Louise, Alberta, Canada.* William Wren Hay. (86) Mar. 29.
 The Electrolytic Method of Preventing Corrosion.* Elliott Cumberland. (Paper read before the Inst. of Metals.) (11) Mar. 31; (22) Mar. 31.
 Grain Elevating and Conveying Plant at Sunderland.* (12) Mar. 31.
 Investigation of Magnetic Laws for Steel and Other Materials. John D. Ball. (3) Apr.
 Special Steels. Samuel L. Hoyt. (55) Apr.
 The Cement Block House.* M. Wetzenstein. (67) Apr.
 Gravel as an Aggregate for Concrete. H. H. Schofield. (60) Apr.
 Influence of Alternating Current on Electrolytic Corrosion. Burton McCollum and G. H. Ashburn. (105) Apr. 1.
 Illumination of Oakland's Auditorium.* Romaine W. Myers. (111) Apr. 1.
 Beams without Lateral Support. R. Fleming. (13) Apr. 6.
 Floating Concrete Plant at Dam No. 39, Ohio River.* Fred C. Todd. (13) Apr. 6.
 Painting by Dipping, Spraying and Other Mechanical Means. Arthur Seymour Jennings. (29) Apr. 7.
 Ventilating a Large Cincinnati Theatre.* (101) Apr. 7.
 The New Chemistry Buildings of University College, London.* F. M. Simpson. (11) Apr. 7.
 Spiral Steel Placed in Power House Foundations.* (14) Apr. 8.
 Screening and Concrete Plants for Building Use Gravel from Cellar Excavation.* W. R. Howard. (14) Apr. 8.

* Illustrated.



Structural—(Continued).

- How Buildings were Appraised in Revaluation of Real Property of Los Angeles. J. C. Bannister. (14) Apr. 8.
- Test Douglas Fir Stringers. (14) Apr. 8.
- Some Provisions of the Revised New York Building Code. (86) Apr. 12.
- Machine for Lining Ditches.* (13) Apr. 13.
- Model Engineering Offices, City of Dallas, Tex.* (13) Apr. 13.
- Exhibition Testing of Concrete. Donald A. Thomas. (13) Apr. 13.
- Influence of Thickness on Tensile Tests.* G. B. Waterhouse. (20) Apr. 13.
- Difficult Underpinning Along William St. Subway.* (13) Apr. 13.
- Interlocking Wood Sheet Piles.* (13) Apr. 13.
- Master Piles Eliminate Rangers in Deep Steel Sheet-Pile Trench.* (14) Apr. 15.
- Dynamite, Oxy-Acetylene, Fire and Cranes Required to Wreck Concrete Bins.* (14) Apr. 15.
- The New Chemical Laboratory of the University of Illinois.* (105) Apr. 15.
- Portable Concrete Plant Builds Louisville and Portland Canal Wall.* (14) Apr. 15.
- Laboratories of the Pennsylvania Public Service Commission.* H. E. Ehlers. (24) Apr. 17.
- How to Estimate Brick and Hollow-Tile Masonry. (76) Apr. 18.
- Designing Compression Members for Small Stresses. Albert Smith. (Abstract of paper read before the Indiana Eng. Soc.) (86) Apr. 19.
- Design and Construction of the Foundation for the Union National Bank Building, Cleveland, O.* R. B. Buettell. (From the *Wisconsin Engineer*.) (86) Apr. 26.
- Hand Drills in Structural Work.* (13) Apr. 27.
- Foam-System Installation for Fighting Oil Fires.* C. P. Bowie. (13) Apr. 27.
- Portable Washer for Aggregates.* (13) Apr. 27.
- Spruce Piles Cannot Stand Compacted Gravel.* Charles T. Main and Henry E. Sawtell. (13) Apr. 27.
- Economy of Continuity in Reinforced Concrete.* Raymond J. Roark. (13) Apr. 27.
- Three Reinforced-Concrete Buildings Alone Resist Flames in Paris, Texas, Fire.* (14) Apr. 29.
- Tests of Hollow-Tile, Flat Arch Floor Slabs Show Effects of Concentrated Loads.* Clyde T. Morris. (14) Apr. 29.
- Le Réservoir à Pétrole de Bakersfield, (California, E.-U.)* (33) Apr. 1.
- Die Prüfung natürlicher Bausteine. P. Martell. (115) Jan. 20.
- Ergebnisse der Prüfung von Portlandzement im Jahre 1914 und die Frage der Erzeugung eines hochwertigen Zements. (115) Jan. 27.
- Die Berechnung eiserner Tragwerksteile auf Knickung. H. Nitzsche. (115) Feb. 17.
- Der Waldfriedhof im "Rheinhard", Schaffhausen.* H. Schlatter. (107) Mar. 11.

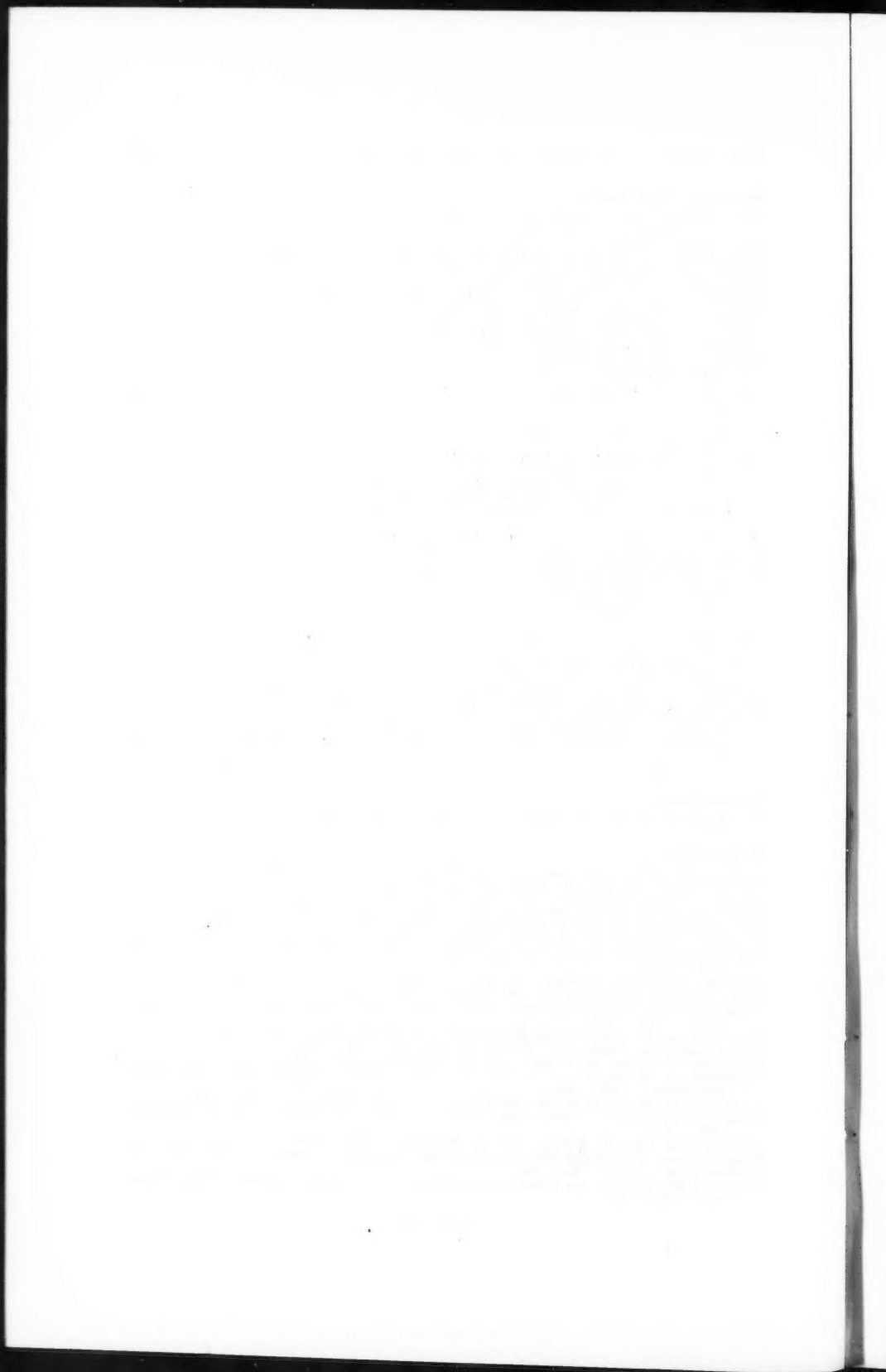
Topographical.

- Precise Levelling by the Geodetic Survey.* F. B. Reid. (96) Serial beginning Apr. 20.

Water Supply.

- Situation at Little Falls, New Jersey. F. W. Green. (59) Mar.
- The Air Lift.* Arthur H. Ford. (59) Mar.
- Sources of Water Pollution. John W. Hill. (59) Mar.
- Filter Operation. S. M. Van Loan and Albert Tolson. (59) Mar.
- The Development of Rapid Sand Filters in Ohio. Philip Burgess. (59) Mar.
- Pneumatic Pumping as Applied to Municipal Plants.* John Oliphant. (59) Mar.
- Earthing Electrical Systems to Water Pipes.* Burton McCollum and O. S. Peters. (59) Mar.
- Methods of Sending Specimens of Water. Jack J. Hinman, Jr. (59) Mar.
- Notes on Fire Protection. T. N. Hooper. (59) Mar.
- Experiments in Water Softening with a Zeolite-Like Substance. Robert N. Kinnaid. (59) Mar.
- Iron Removal by Rapid Sand Filtration.* Frank E. Hale. (59) Mar.
- Water Softening Practice.* Samuel A. Greeley. (59) Mar.
- Resanding Problems at Albany. G. E. Willcomb. (59) Mar.
- Variations in Precipitation as Affecting Water Works Engineering.* Carl Peter Birkinbine. (59) Mar.
- A Mercury Column Alarm for Standpipes.* W. E. Haseltine. (59) Mar.
- Effect of Solutions of Filter Alum on Brass Pipe and Fittings. G. R. Spalding. (59) Mar.
- Cleaning the Bayside Filters. E. G. Manahan. (59) Mar.
- High-Pressure Centrifugal Pumping Plant at Edmonton, Canada.* (11) Mar. 17.
- Medlow Dam.* (12) Mar. 24.
- Essential Elements in the Purification of Water by Storage. Charles Gilman Hyde. (86) Mar. 29.

* Illustrated.



Water Supply—(Continued).

- Special Features of Four New Water Purification Plants in Indiana. John C. Diggs. (Paper read before the Indiana San. and Water Supply Assoc.) (86) Mar. 29.
- The Prevention of Corrosion in Pipe Lines.* F. R. Speller. (Abstract of paper read before the Am. Soc. of Heating and Ventilating Engrs.) (47) Mar. 31.
- Irrigation Pumping by Electric Power. Geo. D. Longmuir. (111) Apr. 1.
- Settling the Princeton, Ind., Water Rates Case. (86) Apr. 5.
- Experience with Full Meterage of Water Supply at Miles City, Mont. G. C. Pruett. (86) Apr. 5.
- More Trouble at Austin Dam.* (13) Apr. 6.
- Wood Against Steel Pipe in Seattle Water-Works. John Lamb. (13) Apr. 6.
- Valuation of Water Rights for Power Companies. J. P. Newell. (13) Apr. 6.
- Water Supply of the City of St. John, N. B. R. Fraser Armstrong. (96) Apr. 6.
- Modernizing the Manchester Water-Works.* (13) Apr. 6.
- The Water Supply of Melbourne.* (12) Serial beginning Apr. 7.
- Experts Report on Meters for Chicago. (14) Apr. 8.
- Test Made of Model Weir.* Ben D. Moses. (14) Apr. 8.
- Contractors Suggest Scheme for Subaqueous Pipe Line. Elliot N. Smith. (14) Apr. 8.
- Utilization of Oregon's Latent Water-powers.* John H. Lewis. (111) Apr. 8.
- Comparison of Wood and Concrete for Use in Irrigation Structures. S. T. Harding. (86) Apr. 12.
- Methods and Costs of Concrete Lining Irrigation Laterals, Orland, Project, U. S. Reclamation Service. A. N. Burch. (From *Reclamation Record*.) (86) Apr. 12.
- The Electric Pumping of Deep Wells at Memphis, Tenn. (86) Apr. 12.
- California Rainfall and Runoff and Recent Floods. M. J. Bartell and R. P. Montreal.* (86) Apr. 19; (13) Apr. 27.
- Water and Sewer Improvements at Madison, Wis.* (13) Apr. 13.
- Plugging Old Water Tunnels.* F. A. Smith. (13) Apr. 13.
- Water-Works Construction in Winter at Hibbing, Minn.* R. E. McDonnell. (13) Apr. 13.
- Small Irrigation Canals Lined with Concrete to Prevent Seepage Water Loss.* C. E. Edwards. (14) Apr. 15.
- Sioux Falls Flume Failure Threatens Water Supply.* (14) Apr. 15.
- Grouting an Effective Remedy for Stoppage Leakage in Tunnels and Shafts.* James F. Sanborn. (14) Apr. 15.
- Fluid Meter for Steam, Water and Gases.* (105) Apr. 15.
- Maintaining a Large Riveted Steel Conduit at Portland, Ore. (86) Apr. 19.
- A New Duty Record for Steam-Turbine Driven Centrifugal Pumps Established Near Montreal.* (86) Apr. 19; (13) Apr. 27.
- Operation Results of the Water Purification and Softening Plant of Fargo, N. D. Frank La F. Anders. (Paper read before the North Dakota Soc. of Engrs.) (86) Apr. 19.
- A Graphical Solution of the Problem of Storm Flow Through a Reservoir.* Albert S. Fry. (86) Apr. 19.
- Impulse Wheels Developed for Silt-Laden Water.* J. W. Swaren. (13) Apr. 20.
- Kingfisher Filter Gallery and Pump House.* (13) Apr. 20.
- Sooke Lake Pipe Line Successfully Operates Through a Hard Winter.* (96) Apr. 20.
- Reinforced Concrete as Applied to Waterworks Construction. Chas. F. Marsh, M. Am. Soc. C. E. (Paper read before the Concrete Inst.) (96) Apr. 20.
- Shore End of Narrows Siphon Built in Open Trench Dredged to Depth of 50 Ft.* (14) Apr. 22.
- Grouting for the Klamath River Dam. Sidney Sprout. (111) Apr. 22.
- Tapping a Lake for Hydro-Electric Power in Alaska. R. E. Murphy. (82) Apr. 22.
- Meter and Pumping Costs in Detroit.* (14) Apr. 22.
- Proper Methods of Laying Wood Pipe.* John H. Curzon. (96) Apr. 27.
- Constant-Level Orifice Box Feeding Chemicals.* Weston Gavett. (13) Apr. 27.
- Irrigation Module Devised for Constant Flow.* Jerome Barieau. (13) Apr. 27.
- Unique Equipment for the Unwatering of New York City's Great Aqueduct.* (46) Apr. 29.
- Steam-Turbine-Driven Centrifugal Pumps.* W. E. Streeter. (82) Apr. 29.
- Electricity Supplants Mesquite-Fired Boiler as Power Source for Pumps.* (14) Apr. 29.
- Tunnel Muck Turned into Concrete Lining Immediately Behind Heading.* (14) Apr. 29.
- Storage Reservoir Feeders Planned to Abate Naugatuck River Nuisance.* Charles H. Preston, Jr. (14) Apr. 29.
- La Distribution de l'Energie Electrique en Catalogne, Installation de la Riegos y Fuerza del Ebro.* (33) Mar. 18.
- Berechnung eines rechteckigen Eisenbetonreservoirs auf elastischer Unterlage.* S. Kasarnowsky. (107) Mar. 11.

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Waterways.

- Ocean Temperatures in the Vicinity of Icebergs. C. W. Waldner, H. C. Dickinson and J. J. Crowe. (Abstract from *Bulletin of the Bureau of Standards.*) (19) Mar. 11.
- The Spillways of the Panama Canal.* Edward C. Sherman. (109) Apr.
- Concrete Freight Piers, Lehigh Valley Railroad. M. W. Latimer. (87) Apr.
- Flood Protection in Indianapolis.* (60) Apr.
- Final Flood Protection Plan for Miami Valley.* (13) Apr. 6.
- Concrete Sheet Pile Groin at Long Branch, N. J.* J. W. Seaman. (13) Apr. 6.
- Rebuilding Barge Canal at the Irondequoit Break.* Emile Low. (13) Apr. 6.
- Bank Protection above Sibley Bridge; Santa Fé Ry.* (13) Apr. 6.
- The New Rhone-Marseilles Canal.* (11) Apr. 7.
- Disastrous Floods in Southern California.* (15) Apr. 7.
- Record Flood from Melting Snows Passes through Rochester, N. Y.* James P. Wells. (14) Apr. 8.
- Large Suction Dredges Depend on High Velocity for Extraordinary Output.* (14) Apr. 15.
- Retarding Basin Plan of Flood Control for Dayton, O., and the Miami Valley.* Arthur E. Morgan. (Abstract from Report to the Miami Conservancy Dist.) (86) Apr. 26.
- Organization of the Hydrometric Survey. P. M. Sander, G. H. Whyte and G. R. Elliott. (Abstract from Report on Stream Measurements.) (96) Apr. 27.
- Water-Supply of Panama Canal under Operating Conditions.* R. C. Kirkpatrick. (13) Apr. 27.
- An Island of Mud that Threatens Memphis Harbor.* (46) Apr. 29.
- Le Canal de l'Erié à l'Hudson ou "Barge Canal" de l'Etat de New York.* P. Calfas. (33) Serial beginning Apr. 8.
- Ueber den Hochstwasserdurchfluss im südlichen Teil Europas.* Philipp Forchheimer. (115) Jan. 6.
- Eine neue Formel für die Ermittlung der grössten Hochwassermengen.* Richard Hofbauer. (115) Jan. 20.
- Die Theorie des Geschiebetriebes und ihre Anwendung. Fritz Schaffernak. (53) Serial beginning Mar. 17.

* Illustrated.